THE INSTITUTE OF PETROLEUM

REVIEW

May 1958

v.12
no.137

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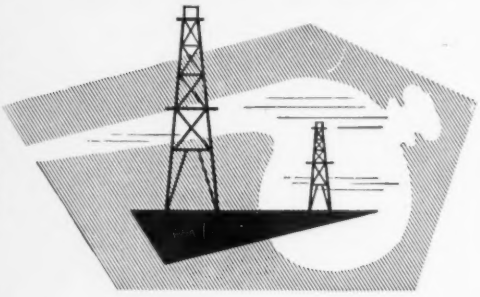

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REVIEW

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Vol. 12, No. 137 **May 1958**

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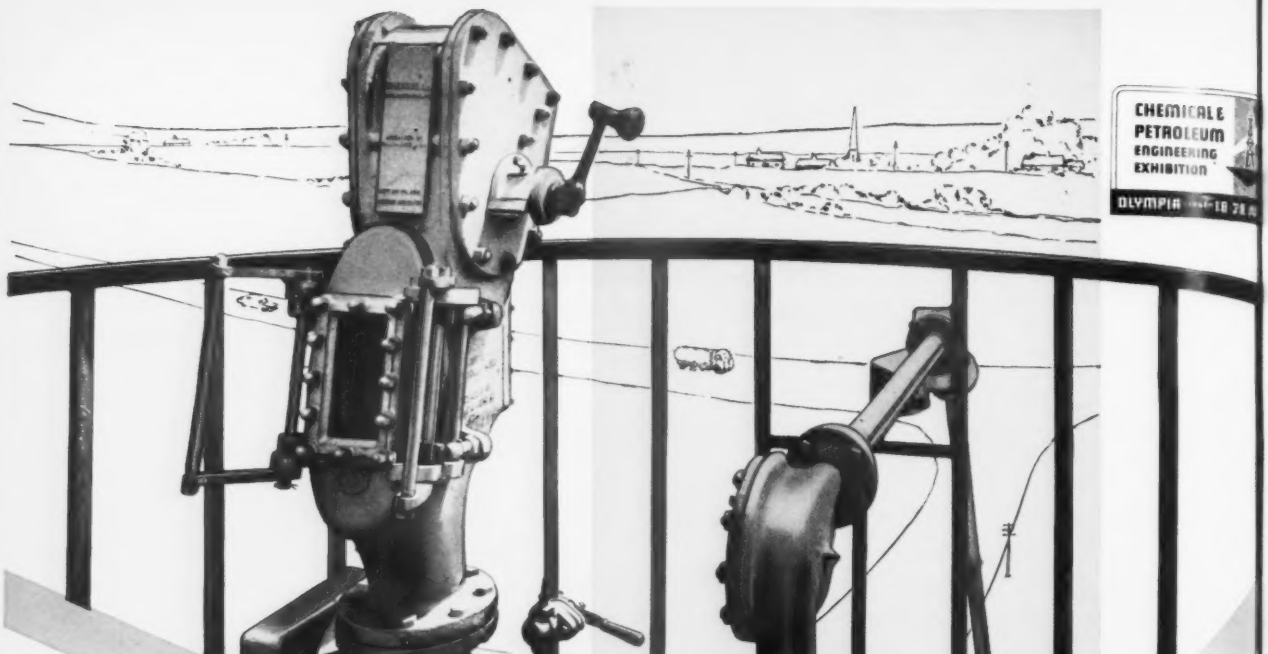

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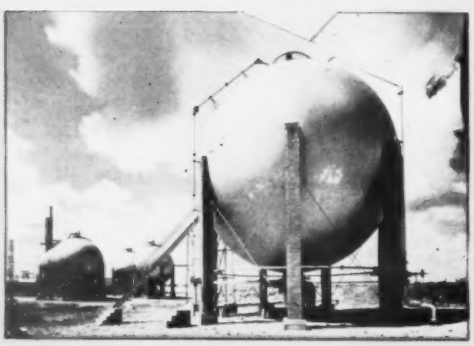

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W106

This building was restored

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Richard Costain Limited were responsible, on the contracting side, for the whole work of construction and adaptation. When the new premises were officially opened by Lord Mills on 28th November 1957, the President of the Institute, Lord Geddes, paid tribute in his speech to Sir Stephen Gibson, Chairman of the building committee, to Mr. R. N. Wakelin, the architect, and to Richard Costain Limited when he said:—

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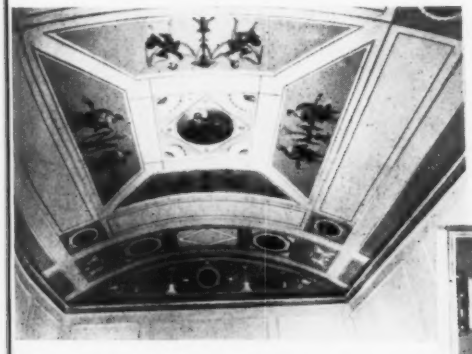
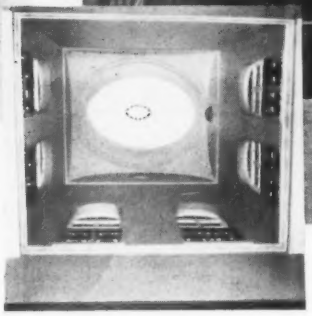


This restored ceiling, which is in the style of the 18th Century and bears the characteristics of Adam's work, shows the care and skill needed on this delicate job.



All the detailed workmanship which remained on this beautiful dome light over the stairwell was copied when they were reconstructed.

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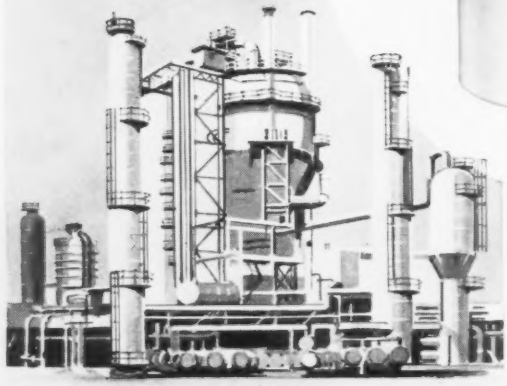

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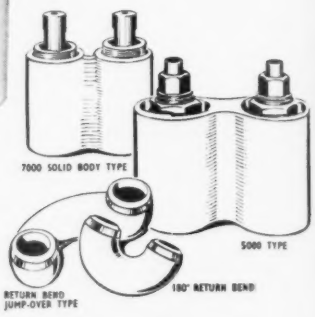

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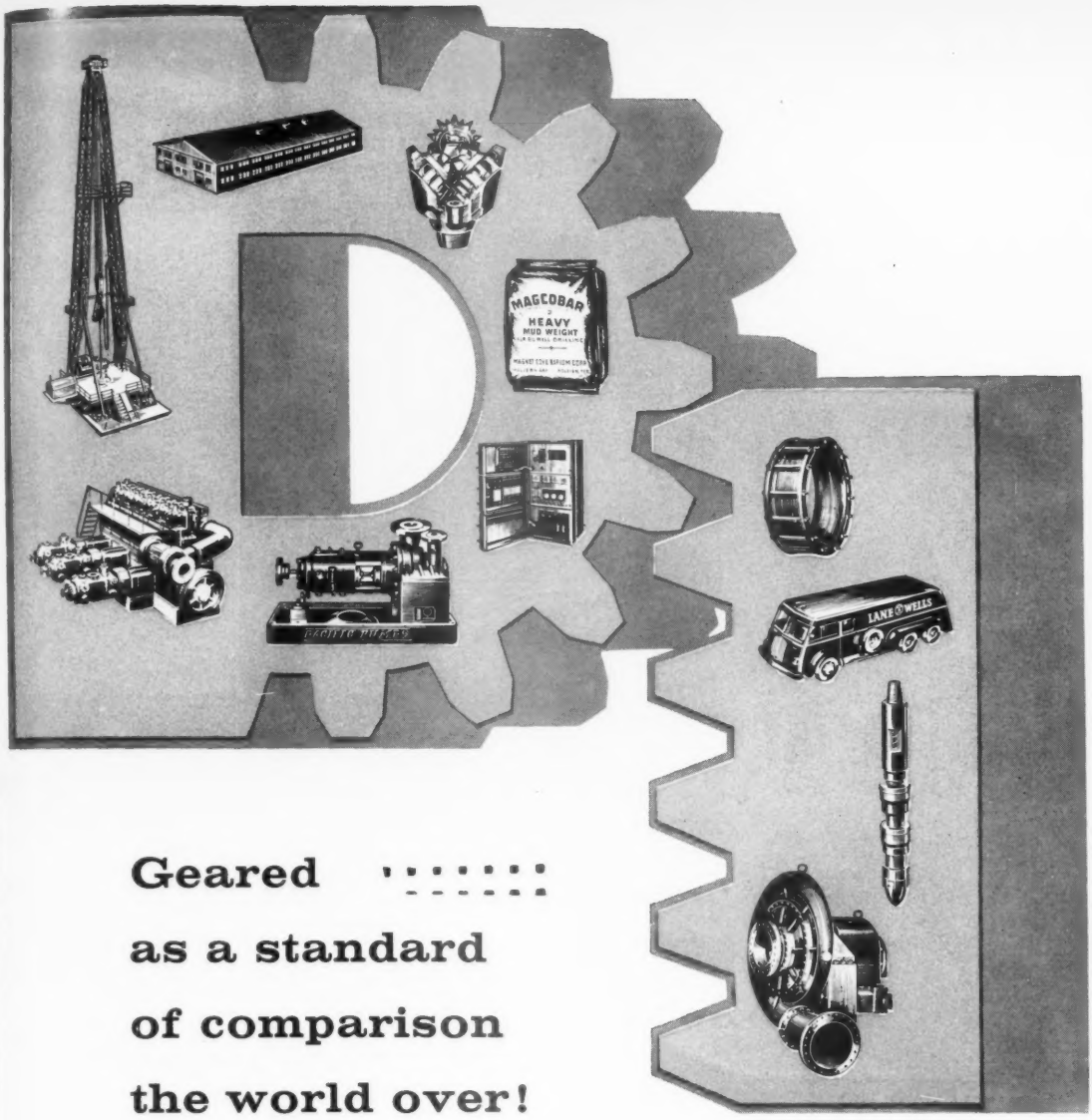

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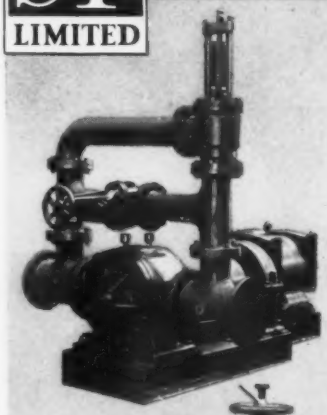
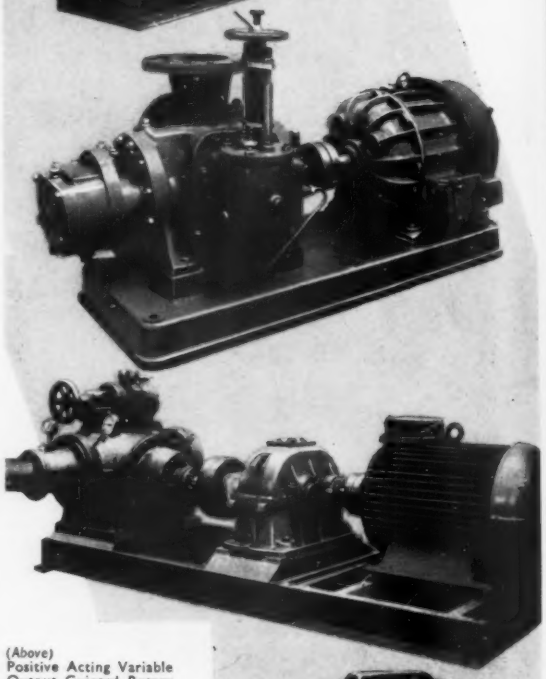


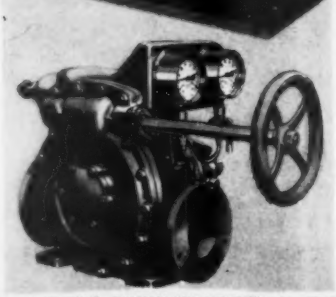
(Left)
Positive Acting Rotary Displacement Pump for the handling of Molasses and viscous fluids, electrically driven through totally enclosed Reduction Gear Box.

(Below)
Suitable for handling Spirits and other volatile fluids, this Screw Displacement Pump is of the all round clearance design and is capable of working with a high suction lift. The flow is practically pulseless and the unit self priming.



(Above)
Positive Acting Variable Output Guinard Rotary Piston Pump. Electrically driven through Reduction Gear Box, for Oils of varying viscosity.

(Right)
Reversing Flow Rotary Displacement Pump for fitting on tank wagons. These pumps are driven from a power take-off on the gear box.



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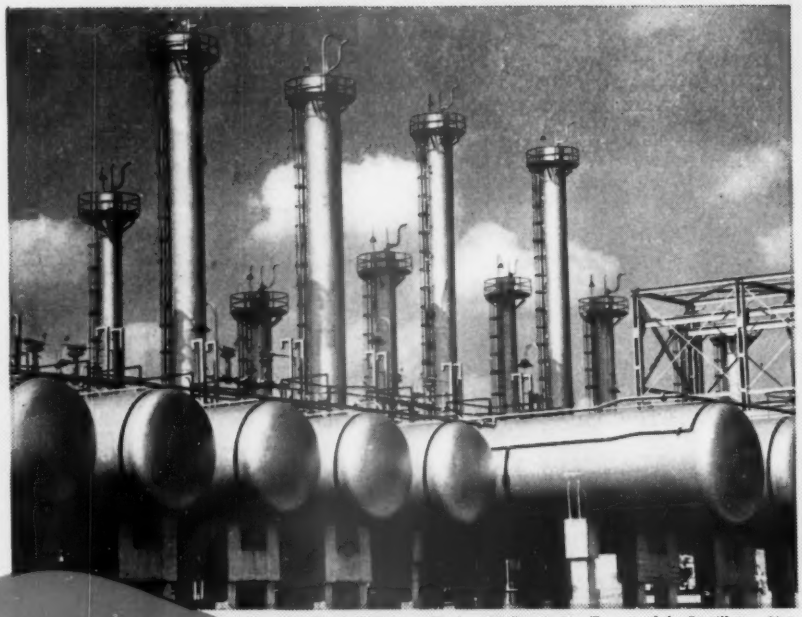

Pressure Storage Tanks with Fractioning Towers of the Distillation Unit at the new Shell Chemical Plant, Stanlow near Chester, Eng. (A Shell Photograph)

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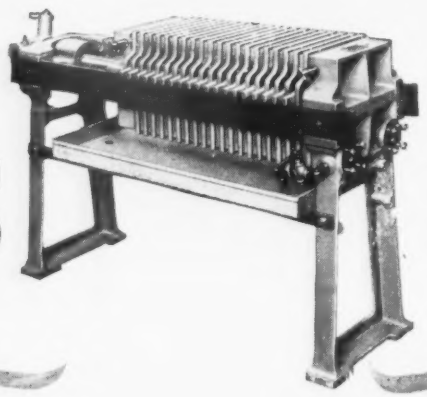

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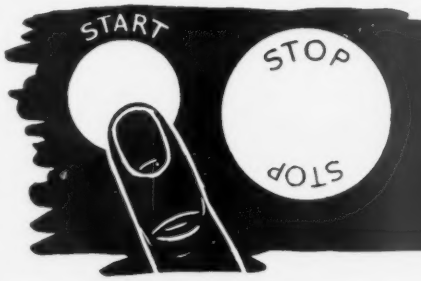

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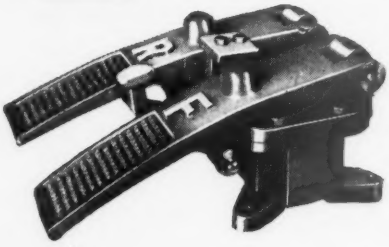
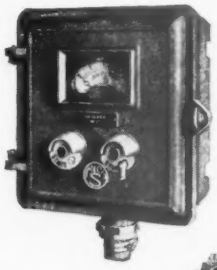
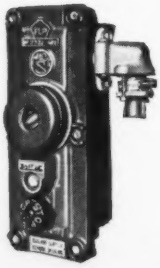


Hoseproof Twin Pedal Control switch for use in conjunction with a contactor starter. Arranged for forward and reverse operations.

2-Point start/stop switch with ammeter.

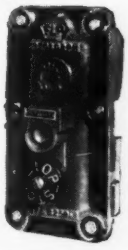


Flameproof 2-Point start/stop switch with indicating lamp.



2-Point start/stop switch.

Flameproof 2-Point start/stop switch.



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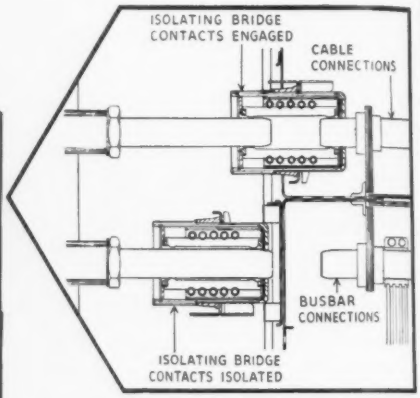

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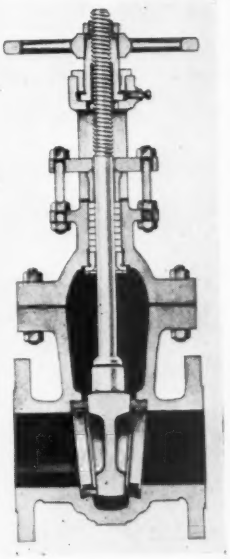
	4	9	15/16	9	6 3/16	1/16	27
	6	11	1	10½	8½	1/16	35½
	8	13½	1⅛	11½	10¾	1/16	45
	10	16	1 3/16	13	12¾	1/16	53½
	12	19	1¼	14	15	1/16	60½
CLASS 300	2	6½	¾	8½	3¾	1/16	20¾
	3	8¼	1⅛	11½	5	1/16	24¾
	4	10	1¼	12	6 3/16	1/16	30¾
	6	12½	1 7/16	15¾	8½	1/16	39½
	8	15	1½	16½	10¾	1/16	47½
	10	17½	1⅞	18	12¾	1/16	56¾
	12	20½	2	19¾	15	1/16	63¾



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THE INSTITUTE OF PETROLEUM
REVIEW

Volume 12, No. 137 May 1958

Honorary Editor: E. B. EVANS, M.Sc., PH.D., F.R.I.C. *Hon. Associate Editor:* D. L. SAMUEL, B.Sc., A.R.I.C. *Editor:* GEORGE SELL

The Homes of the Institute

When the Institute of Petroleum was founded in 1913 as the Institution of Petroleum Technologists, its first office accommodation was provided by its joint-founder, Arthur W. Eastlake, in his own offices at 17 Gracechurch Street in the City of London. Some may remember that these offices were located in the base of the light-well and were noteworthy for their extensive skylights.

The Institution had hardly been founded when war broke out and so these first offices had to suffice until more settled conditions came about. With the end of the war and a rising membership, larger accommodation became a necessity and December 1919 saw the Institution establishing its first connexion with the buildings of the Adam Brothers. This was when it moved into No. 5 John Street, Adelphi, where it had a Council Chamber, which also housed the small library in somewhat more dignified surroundings than had previously been possible. In addition, there was general office accommodation and a room for the general secretary.

It was not long before the growth of the Institution was such as to render the 600 square feet at 5 John Street inadequate and so, in June 1923, a move was made to premises of about 2400 square feet in Aldine House, Bedford Street, Strand, London, W.C.2. This was a vast improvement, providing as it did a much-enlarged library and, for the first time, a members' room. Incidentally, the latter was the venue of many interesting meetings held by the then very active London Branch of the Students' Section. Many members of the Institute will remember the bridge which had to be crossed to reach the office door.

The Library and Members' Room at the Adelphi

In October 1938, the lease at Aldine House having expired sixteen months before, the Institute returned to its old haunt in the Adelphi, this time to the newly-built Adelphi building. It is of interest to note in passing that one of the houses demolished to make way for the new building was 5 John Street.

The Adelphi premises were a considerable advance on the previous premises of the Institute and promised to be its home for a lengthy period. But this was not to be, for in 1939 again war intervened and immediately the Adelphi was requisitioned by the Government, leaving the Institute no option but to find another at least temporary home. Through the good offices of Professor A. W. Nash and the generosity of the University of Birmingham, the IP was offered and accepted accommodation there in the Department of Oil Engineering and Refining.

By 1942 it was found that the work of various committees was being hampered by the absence of headquarters from London. So, in June, by courtesy of the Governors of the Imperial College, temporary accommodation was provided at the Royal School of Mines pending the acquisition of other premises in London.

In November 1943, the IP moved to its second Adam building at 26 Portland Place, London, W.1. At first, accommodation was limited to the second floor, and one room on the first floor to serve as a small library and for Council and committee meetings. These premises offered a great advantage in that a lecture theatre was available in the building and this has been the venue of the majority of the IP meetings since that date.

Eventually, the IP was able to take over the occupation of the whole of the building above the ground floor. It was then able to re-house its main Library, the contents of which were still stored in the Adelphi, and to provide more accommodation for committee meetings and for the expanded staff needed to run the affairs of a progressive institute.

Now, the IP enters into its third Adam building and into its own building, with its own lecture theatre, library, members' reading room, and sufficient space to meet its requirements for a very long time. No. 61 New Cavendish Street, as was said in the March 1956 issue of the *IP Review*, is "one of the notable historical houses of the Regency period".

The Adam Brothers

When the Institute of Petroleum acquired the new premises the *IP Review* informed members that the house had been built by Robert Adam in 1777. It has subsequently transpired that No. 61, like most other Adam buildings, was constructed by the firm of Adam Brothers, with each of the four brothers contributing some share.

"We have adopted", wrote Robert Adam (who was the eldest and the most famous of the four) "a beautiful variety of light mouldings, gracefully formed, delicately enriched and arranged with propriety and skill", and, if perhaps Robert Adam was not quite the person to say so, that is exactly what the brothers had done.

After the heavy ornateness of the Jacobean style, English architecture had swung back to a severely classical style, under the leadership of Sir William Chambers. This able architect dominated the scene until 1769, when the four Adam Brothers started business as architects, interior decorators, builders, and furniture designers.

English history can produce a long list of men and women who have risen to greatness under the particular conditions of their time, and the advent of the Adam Brothers coincided with a period of great individual wealth, and an ever increasing demand for gracious and luxurious living. The new Adam style of lightening the severely classical style of Chambers with graceful mouldings and rich decoration swept through aristocratic society like a prairie fire.

One of the Brothers' forms of genius was their ability to redesign the front of a town house, already standing obscurely in a row of others and, by regrouping the windows and introducing light stucco mouldings, make the building "stand out from its fellows like a real jewel in a pasteboard crown".

They built and altered hundreds of houses in London and the country, and also designed much of the furniture to match the interior decoration. Indeed nothing seemed to be beyond their scope and among the various beautiful objects they created were knife boxes, clock cases, snuff boxes, a wonderful sedan chair for Queen Charlotte, and a dog kennel.

Their most ambitious project was to build the Adelphi as a speculation, which was not a financial success, and ended with their obtaining a Parliamentary Bill to allow them to dispose of the entire property by means of a lottery. Unfortunately history does not seem to have recorded the price of the tickets!

The greatest of the four brothers was undoubtedly Robert, who was the architect for the Adelphi building: James was for a time architect to George III, and is generally credited with the construction of Portland Place, but in fact surprisingly few details of the four brothers have survived.

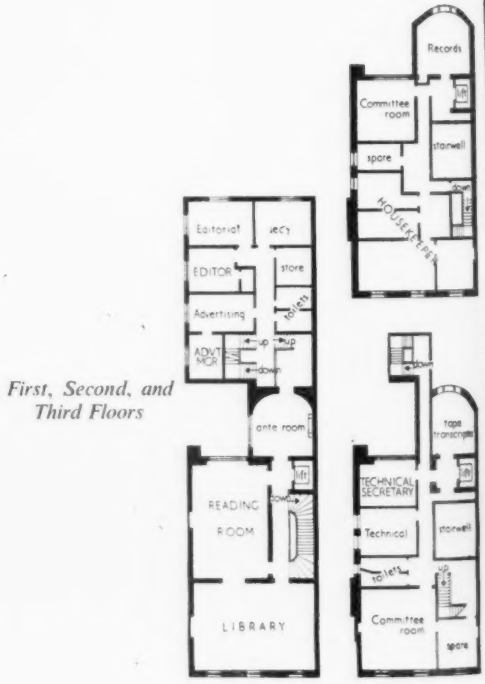
After the death of James in 1794 the partnership of the brothers came to an end, but the style they had created was continued for another twenty years by other hands.

Even in their own day they were sometimes suspected of using inferior materials, but in spite of this their genius has never been doubted, and the word Adam means to many people the most beautiful of all the periods of British architecture.

The lay-out of

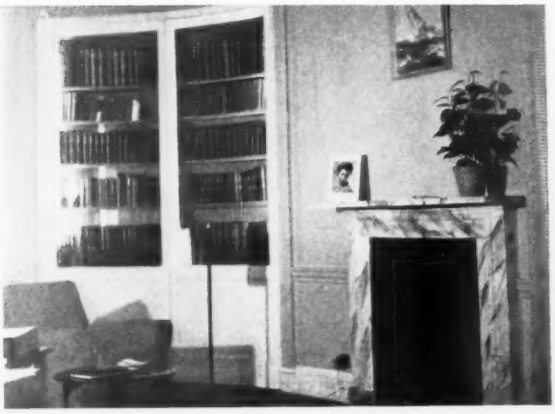
61 New Cavendish Street

Basement and Ground Floor

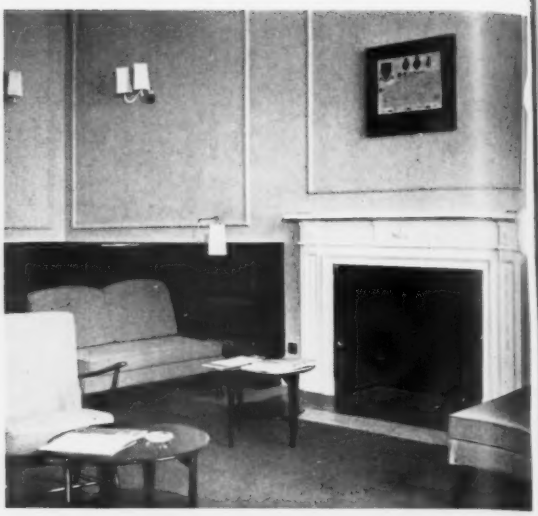


First, Second, and Third Floors

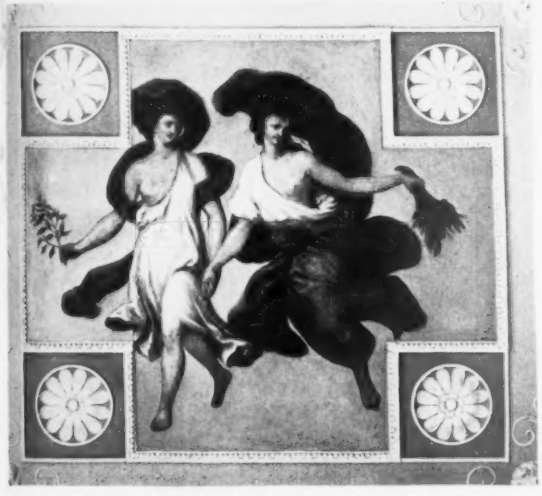
A Pictorial Tour of the New Headquarters

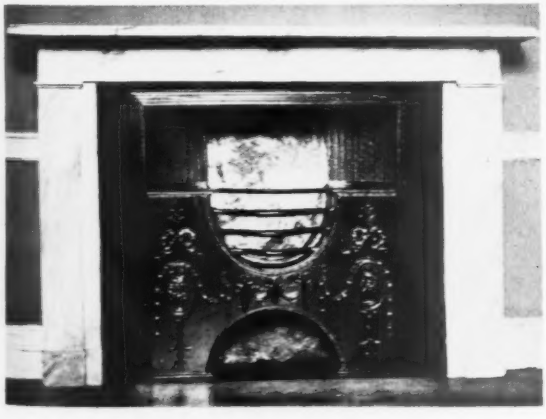


An imposing building from the outside, let us take a look inside. So into the hall, passing through the glass door and turning left into the Council Room. Then, a peep into the General Secretary's office (top right) *before proceeding up the main stairway, pausing for a moment to look up to the dome. A magnificent view this*



On the first floor our first visit is to the Library, with its very fine ceiling, a close-up of the centre portion being seen in the lower picture above. We now pass into the Reading Room (top right), *which has an ornate curved ceiling, the centre panel of which is seen to the right*





On the first floor also is an ante-room, which has a domed ceiling (top and centre left) *and a specimen of an ancient coal-burning appliance. Now to the second floor for a closer view across the stairwell and a peep into a committee room*

Back now to the ground floor to go via the waiting-room (top left), *down the stairs to the basement, where we see the entrance* (top right) *to the fine Lecture Theatre pictured below. Photos: Bottom right, page* 145, *top centre left and centre right, page* 146; *top left, page* 147; *centre and bottom, page* 148; *all by Sydney W. Newbery. All others by George Sell*

Kuwait Oil

A Record of Achievement

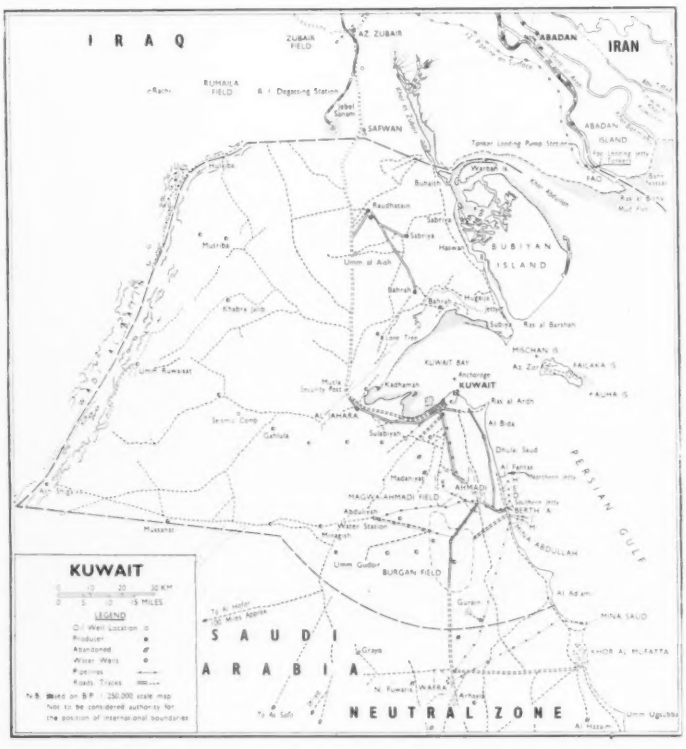
At the end of 1957 *the Editor of the* IP Review *was privileged to visit Kuwait and to inspect the oil installations there through the courtesy of the Kuwait Oil Company. This article and the pictures accompanying it are based upon that visit*

The history of the oil industry of Kuwait, to-day fourth in the list of oil-producing countries and the largest producing area in the Middle East, is a remarkable story of achievement. An interesting development also is the fact that Kuwait is now the supplier of over 35 per cent of Britain's total oil requirement.

Although the first exploration work was carried out in 1936, it was not until June 1946 that commercial production commenced and the first shipment of crude oil was loaded. In the comparatively short interim of twelve years a completely integrated oil industry has been built up in Kuwait, covering all operations from exploration to the supply of finished products to the consumer.

The Kuwait Oil Company's headquarters at Ahmadi, about 22 miles south of the town of Kuwait, is located at a distance of about ten miles from the centre of the producing fields of Burgan, about six miles from the Magwa-Ahmadi field and about the same distance from the oil loading jetty at Mina-al-Ahmadi. In 1946 Ahmadi was just desert, practically trackless—to-day it is a large and thriving oil community housing the staff and their families and providing stores and facilities for all the day-to-day needs of the industry.

Still the expansion continues. A new jetty and tank farm are under construction, the refinery has just been expanded to increase its throughput more than six-fold, and the search for new oilfields in the State proceeds apace.



HISTORY

The exclusive concession for the exploitation of oil in the State of Kuwait was first granted at the end of 1934. It is held jointly and equally by subsidiaries of The British Petroleum Company Ltd and of the Gulf Oil Corporation. The concession is operated on behalf of the owning companies by Kuwait Oil Company Ltd. Originally the concession was for 75 years on a royalty basis but in 1951 its validity was extended to 2026 and the terms amended to give the Ruler of Kuwait a 50 per cent share in the total profits from the operations in Kuwait.

Exploration work and geological surveys during 1935 and 1936 led to the drilling of the first well at Bahra, on the north of Kuwait Bay. This well was completed at 7950 ft and although commercial production was not obtained the results were sufficient to justify further work. The scene of activity was then moved to Burgan, nearly 30 miles to the south, where some surface evidence of bitumen deposits had been observed. Here a well was drilled to a depth of 3672 ft with most encouraging results. Eight additional wells were drilled in the Burgan area and extensive geological work was carried out until in 1942 supply and manpower problems brought about suspension of the operations.

At the conclusion of the second world war operations were resumed on the basis of a designed production of 30,000 barrels a day from the Burgan area. As already mentioned, the first commercial shipment of crude oil from Kuwait was made in June 1946.

Present production from the Kuwait oilfields is of the order of 1·5 million barrels per day and is obtained from the Burgan and Magwa-Ahmadi fields, the locations of which are shown on the accompanying map. Annual production since 1946 is shown on the graph (Fig 1) and in Table I.

The Northern Areas

As already mentioned, the first well in Kuwait was drilled at Bahra, on the north shore of

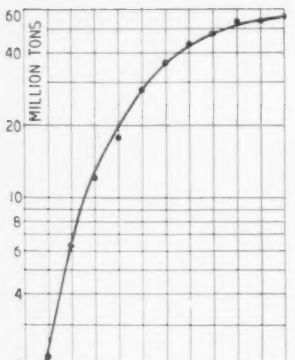


Fig 1. *Kuwait crude oil production*

Kuwait Bay, and it is in the northern part of Kuwait that much of the geophysical work of recent years has been carried out.

In 1954 it was decided to proceed with exploratory drilling and the site chosen was Raudhatain, about 25 miles NNW of Bahra and about 30 miles SE of the Rumaila field in south Iraq. This well, and a second well completed later, both penetrated formations characteristic of those producing in Burgan. Other wells are at present being drilled as part of a programme to determine the commercial possibilities of this area and the extent of the oilfield.

At Sabriya, about 10 miles SE of Raudhatain, a wildcat well had found some oil and at the time of the visit selective acidizing and production tests were in progress. Some 30 miles west of Raudhatain, at Mutriba, a test well based on seismic and other work, was in course of drilling and it was believed that prospects for oil were reasonable.

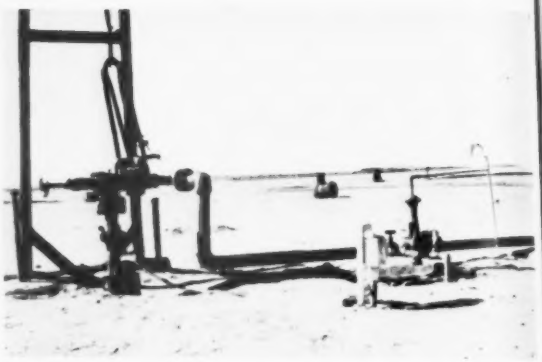
OIL PRODUCTION

Unlike other oilfields in Persia and in Saudi Arabia, the producing formations in Kuwait are composed of sand or sandstone. Their geological age is Middle or Lower Cretaceous and the maximum depth of the productive zone is about 5000 feet. There are three major oil-containing horizons, separated by shale or limestone layers, and the zone is underlain by salt water. Specific gravity of the oil averages 0·868 (31·5° API), varying however with the depth below sea level from which it is produced. Gas : oil ratio is about 500 cu.ft gas per barrel of oil

Altogether there are over 200 wells currently producing in the two major fields—Burgan and Magwa-Ahmadi—in both of which the production pattern is similar. Most of these wells are dual producers and generally the oil from the upper zone is produced through the casing and that from the lower zone through the tubing. In some cases, however, a crossover packer enables the upper zone to be produced through the tubing and the lower zone production to come to the surface through the casing. At the Christmas tree or control head the flow-lines are taken off from both sides of casing and tubing and production rates are controlled by chokes placed in these lines. It is usual to maintain a small differential between the choke sizes in the pairs of flow-lines. The four lines from the Christmas tree are connected directly into the main flow-line. Further control of production rate can be exercised at the gathering centre by means of valves on the flow-lines.

From each well a flow-line, usually of $6\frac{5}{8}$-in diameter and supported on specially-designed concrete blocks, runs to one of the twelve gathering centres which are suitably located in the two fields.

A deep test well at Raudhatain



Water supplies at Raudhatain are obtained from drilled wells

TABLE I

KUWAIT
CRUDE OIL PRODUCTION

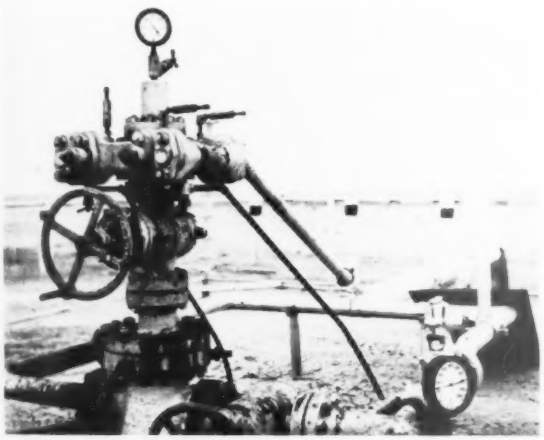
Year	*Number of connected wells*	*Production*	
		Total tons	*Average per well tons*
1946	8	797,350	99,669
1947	13	2,185,309	168,100
1948	32	6,291,577	196,612
1949	61	12,183,669	199,732
1950	78	17,018,666	218,188
1951	109	27,783,170	254,908
1952	126	37,042,122	293,986
1953	149	42,603,244	285,659
1954	163	46,969,415	288,156
1955	185	53,894,068	291,319
1956	211	54,117,349	256,480
1957	238	56,375,946	236,874

The Gathering Centres

At the point where the flow-line enters the periphery of the gathering centre there is a valve in the line so that the oil can be cut off in any emergency at a safe distance from the centre. From this point the flow-line goes to a second valve and then on to two headers, one of which connects to the main gas separator circuit and one to a test separator circuit. By this arrangement it is possible to vary the combination of wells from which the oil is flowing in either circuit.

One important purpose of the gathering centre is to remove the gas from the crude oil. This is accomplished by passing the crude oil-gas mixture through a series of cylindrical separators which are slightly inclined to the horizontal. The oil-gas mixture enters at about the mid-point of the cylinder and, as it gravitates to the lower end, the gas is released and travels to an outlet in the upper end of the cylinder. From here the gas goes to the high-pressure flare for disposal by burning. Pressure in the flare is about 15 psi. The partly degassed crude oil flows on into the next stage.

Originally gas separation was carried out in seven stages, but the current practice is to use three stages only. Consequently, the separators are generally operated in parallel pairs. The first stage is operated at 425 psi and about 100° F, and the second stage at 40 psi and 90° F.



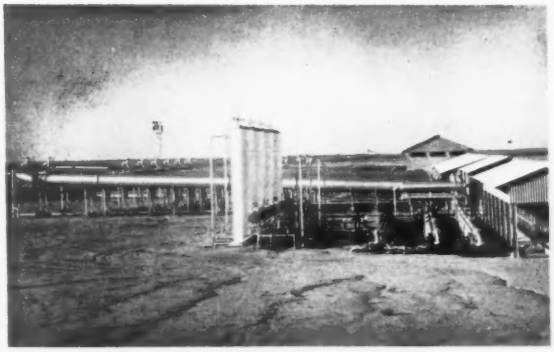
A producing well in the Magwa field. Flow-lines from the casing are seen on either side at the bottom of the Christmas tree. The lines from the tubing are connected to the single line to the main flow-line

The third degassing stage is carried out in the storage tank into which the oil flows from the second stage. This tank is sealed, the gas being led away from a dome in the roof at a pressure of about 2 inches wg to the low-pressure flares.

At most gathering centres small separators of the vertical type are installed and are mainly employed for production tests and for gas-oil ratio determinations. They can also be used for normal gas separation when necessary.

Gas Utilization

The gas separated from the crude oil is the main source of industrial power in Kuwait. It is piped from the Burgan field to Kuwait town, where it is used for fuelling the electrical power station and the water distillation plant. With the growing modernization of Kuwait town the demand for gas power is increasing continually.



No. 8 gathering station. The main horizontal gas separators are seen behind the vertical test separators

At Mina-al-Ahmadi petroleum gas provides power for the Kuwait Oil Company's electrical power station, and fuel for their water distillation plant and refinery. On a minor scale the gas is utilized in all the domestic gas cookers and heaters in Ahmadi.

Plans are also in hand for gas which is surplus to the present requirements to be recycled into the reservoir. This will preserve it for future use and also help to maintain as long as possible a high reservoir pressure.

CRUDE OIL PUMP STATIONS

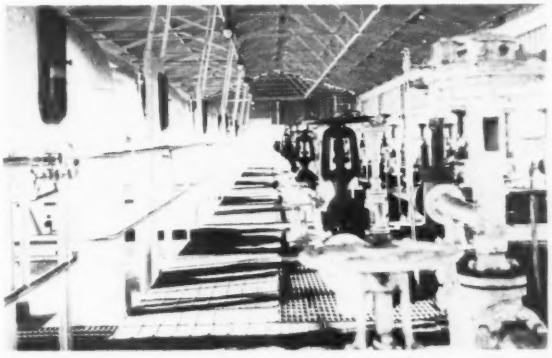
From the gathering centre the crude oil is conveyed through $12\frac{3}{4}$-in collecting lines to one of the main transit lines carrying the oil to the tank farm at Ahmadi. At present there are four such main lines in the Burgan field, one of 30–34-in diameter, one of 20–22-in, and two of 20-in. In the Magwa field there is one 16-in main line.

The design of pump stations at the various gathering centres is generally similar, with some variation in prime movers.

In all cases centrifugal pumps are rated at 1000 gpm. Prime movers in the main operate as gas engines and speed-increasing boxes are installed between engine and pump.

A notable exception and worthy of mention is at No. 11 gathering centre in Burgan. Here one of the prime movers

Inside the gathering station. Flow and pressure recorders are to the left and flow control valves to the right

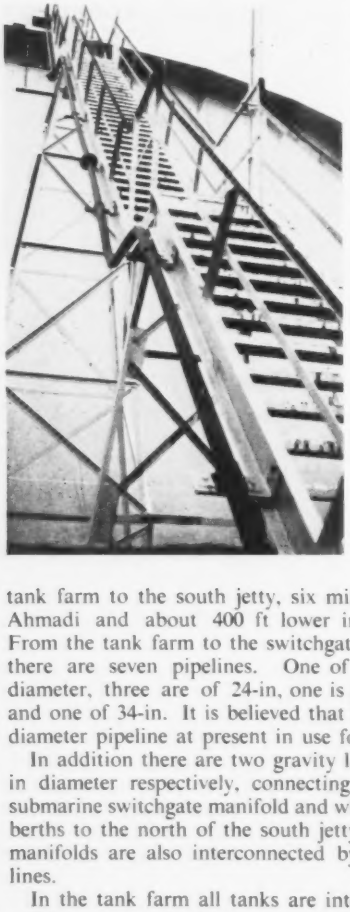


is a Ruston and Hornsby gas combustion turbine, the gas being taken from the high-pressure separators. In this case it is essential that the gas should be absolutely free from any entrained oil which on no account must reach the combustion chamber. To ensure this, special filtering gear is installed and fitted with automatic cut-outs which operate immediately if any liquid is present. The present unit has been in operation for over ten thousand hours and is reported to have given satisfactory service. It is understood that other similar units may be installed in the future.

Another exception to the main pattern of pumping plant is at No. 8 gathering centre. Here the pumps are driven by three Allen gas expansion turbines using natural gas as the operating medium. The gas enters the turbine at about 180 psi and 190° F and exhausts at about 70 psi.

THE TANK FARMS

At present the production from both fields is, as already mentioned, conveyed by the main transit lines to the south tank farm at Ahmadi. Here, there are thirty-four crude-oil storage tanks with a total capacity of nearly six million barrels, made up of six with capacities of 139,000 barrels each, twenty-two of 168,000 barrels each, and six of 210,000 barrels each. There is also one 168,000 barrel tank used for water.



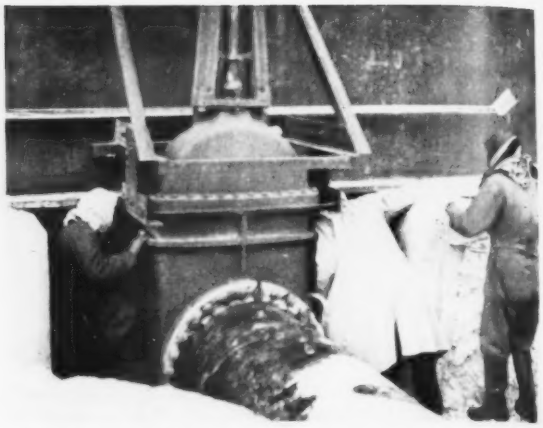
Fire precautions in the tank farm are of importance. The line to the left of the ladder is a fire line. All tanks are so fitted

Oil flow from the tank farm to the south jetty, six miles distant at Mina-al-Ahmadi and about 400 ft lower in level, is by gravity. From the tank farm to the switchgate manifold at the jetty there are seven pipelines. One of these lines is of 22-in diameter, three are of 24-in, one is of 30-in, one of 32-in, and one of 34-in. It is believed that the latter is the largest diameter pipeline at present in use for oil transportation.

In addition there are two gravity lines, of 22- and 32–34-in diameter respectively, connecting the tank farm to the submarine switchgate manifold and which feeds to submarine berths to the north of the south jetty. The two switchgate manifolds are also interconnected by three 24-in diameter lines.

In the tank farm all tanks are inter-connected in groups and between groups by cross-connexions. This is essential if the relation between incoming and outgoing crude is to be kept sufficiently flexible to meet all needs.

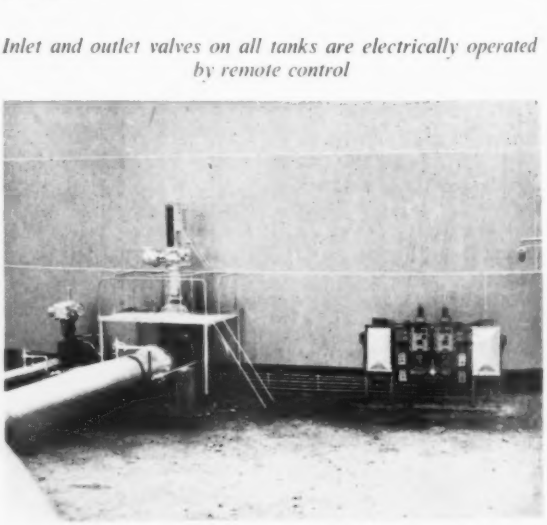
Control of all tank farm operations is from one central control building. Inlet and outlet valves on all tanks are electrically operated by remote control from the central point and can also be operated at the tank itself if necessary. Electrically-operated indicators in the control room show at any moment the exact oil height in the tank and the position of the valves. It was in fact observed that the height indicators were so sensitive that the effect of wind blowing on the tank roof and causing an oil movement of as little as $\frac{1}{4}$ in was immediately apparent.



Some tanks are being fitted with bottom outlets. An internal baffle will prevent "bottoms" reaching the outlet pipe

Coincident with the construction of a new north jetty, about which more will be said later, a new tank farm is being built about six miles inland from the coast at Al Fantas and at about 375 ft above sea level. The tanks will number fifteen, of which fourteen will each be of 262,800 barrels capacity and one of 210,000 barrels, a grand total of nearly 4 million barrels. As in the case of the south tank farm, oil flow to the jetty will be by gravity and it was understood that three 38–40-in pipelines would connect tank farm to jetty. There will also be a cross connexion to the south tank farm by a 30-in line.

Inlet and outlet valves on all tanks are electrically operated by remote control



THE JETTY

One of the first pieces of major construction when Kuwait Oil Company entered the oil picture was the oil jetty, now known as the south pier, which was completed in 1949. Believed to be the largest oil jetty in the world, its head is about 4000 ft out to sea in a minimum water depth at loading point of 40–49 ft, thus making it possible to berth the largest tankers at present afloat. On the northern arm of the head are berths for six tankers while the two cargo berths on the southern arm are now fitted to be available for oil loading.

Alongside the 24-ft roadway on the approach to the head is a 35-ft pipeway carrying eight crude oil-loading lines, seven of 24-in and one of 30-in diameter. With such lines it is not surprising that rates of loading are always high. For example the *Universe Commander* loaded nearly 81,000 tons in 19¼ hours—and that was not the record. Incidentally, it is true that when a vessel is being loaded at Mina it can actually be seen getting lower in the water as loading proceeds.

30-in lines are being installed in some parts of the south tank farm

In addition, the pipetrack also carries one 16-in line for bunker fuel and one 12-in line for marine diesel fuel.

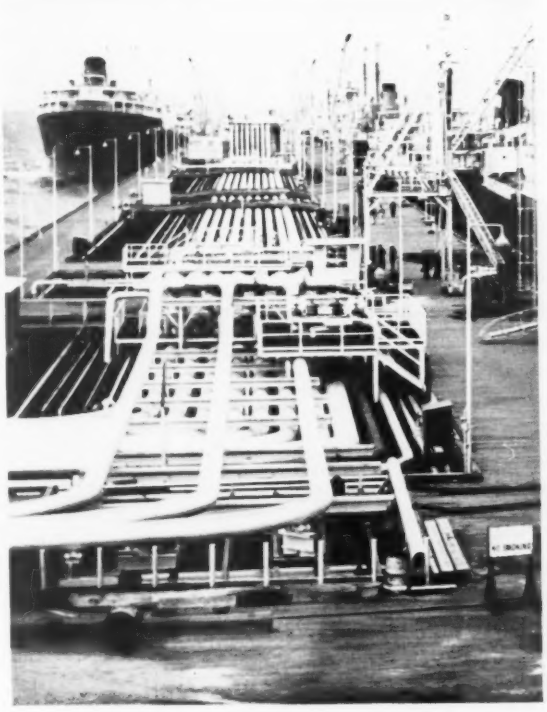
There are also, to the north of the jetty, four submarine loading berths and one to the south of the jetty. To three of these berths there is a 24-in crude oil line and a 12-in bunkering line. The other two berths are allocated to white products, each having two 12-in lines.

The importance of crude oil loading operations to the oil industry of Kuwait is amply illustrated by the details of loadings given in Table II and by the curves in Figs 2 and 3. The similarity of the curve of crude oil exports in Fig 2 to the total production curve in Fig 1 is indicative of the close integration of the two operations and points to the need for the considerably expanded loading facilities now being installed at the world's largest oil-loading terminal—Mina-al-Ahmadi. News of these expansions has already appeared in the columns of the *IP Review*, but they will bear repeating.

The first and most immediately available expansion is the provision of two new submarine loading berths, one for crude oil and fuel oil as bunkers or cargo and one for black products as cargo and bunkers. Both cargo lines are 24-in diameter and fuel-oil lines are 12-in diameter. All these lines were launched in 1957 and at the time of the inspection the shore installations were being completed.

Looking back from the jetty head towards Mina-al-Ahmadi. The flow-lines are to the right of the roadway and the building under construction will be a recreation centre for crews of tankers who are not allowed to leave the jetty

The second project, on which work has been started and which is expected to be completed within a couple of years, is a new jetty—the north jetty—about four miles north of the south jetty. Depth of water at the pier head, about 5700 ft from the shore, will be 55–60 ft. Initially berths for three of



A general view along the south pier towards the north

A deck view of Universe Commander *loading over* 80,000 *tons of Kuwait crude*

the largest tankers yet contemplated will be provided and it is anticipated that loading rates of up to 6750 tons per hour will be possible with the facilities which it is at present intended to instal.

THE REFINERY

Hitherto the local requirement of refined petroleum products and of bunker fuels for vessels has been met by the Company's comparatively small refinery at Mina-al-Ahmadi. Located close to the south pier, this refinery was brought into use in 1949. Consisting essentially of a topping plant, a gasoline refractionator and stabilizer, a chemical treating plant for gasoline, and a bitumen plant, its capacity was 30,000 barrels of crude oil daily. Its products were motor gasoline, kerosine, gas oil, marine diesel oil, fuel oil, and bitumen.

An interesting piece of plant in the refinery is the bitumen plant. This plant was improvized in 1952 when supplies of bitumen from Abadan were cut off. It consists mainly of converted Lancashire boilers as vacuum stills, a vacuum condensing tower, and a continuous and a batch blowing tower for air-blown grades of bitumen. This plant to-day produces all the grades of bitumen required by the Kuwait State Public Works Department for its road and other programmes, and also for various uses of the Kuwait Oil Company, *i.e.*, roads, roofing, pipe paints, etc.

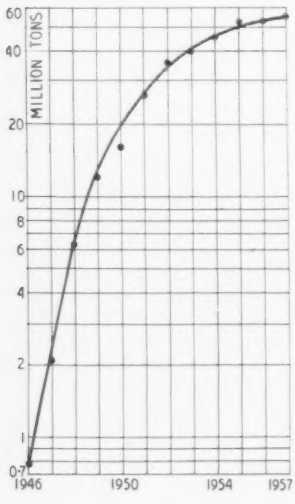


Fig 2. *Kuwait Crude oil exports via Mina-al-Ahmadi*

Recently it was decided to increase considerably the capacity of the Kuwait Refinery to meet a much increased local demand for products, bunker oils for ships, and to provide a surplus for export. Total daily capacity is being stepped up to 190,000 barrels by the addition of two atmospheric crude oil distillation units each of 80,000 barrels daily capacity and each with a gasoline stabilizer. These units were designed by E. B. Badger & Sons Ltd.

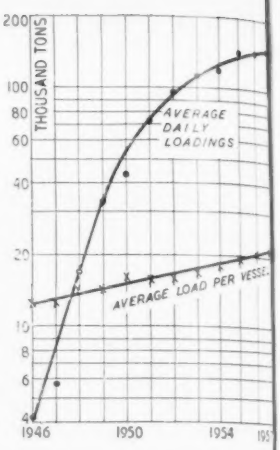


Fig 3. *Tanker loading operations at Mina-al-Ahmadi*

To meet this increased throughput has entailed not only a complete reorganization of the whole refinery but also the provision o

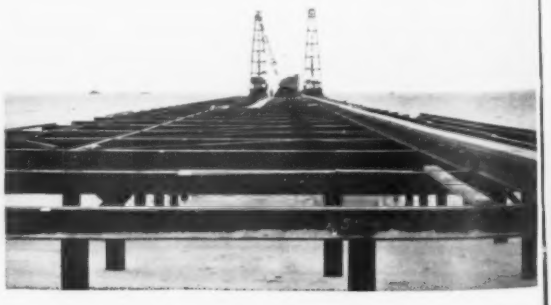
TABLE II

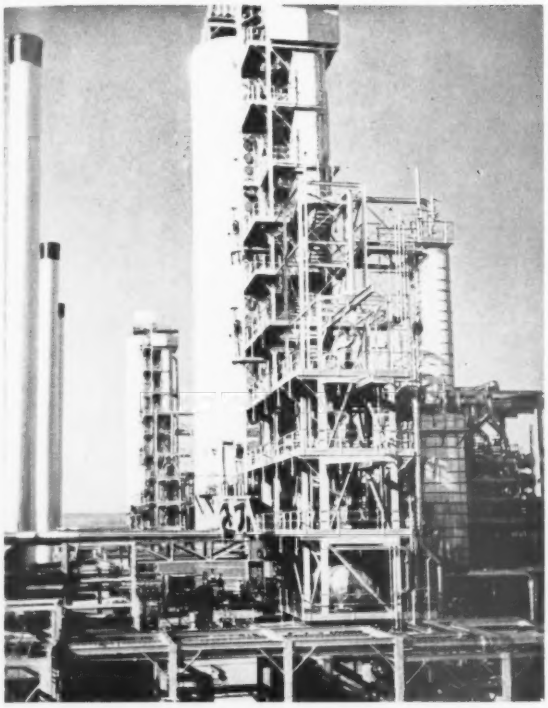
CRUDE OIL LOADING OPERATIONS AT MINA-AL-AHMADI

Year	*Number of ships loaded*	*Total*	*Tonnage Loaded*	
			Daily average	*Average per tanker*
1946*	61	768,441	4,178	12,597
1947	168	2,113,646	5,790	12,581
1948	436	6,244,815	17,062	14,323
1949	802	12,010,102	32,904	14,975
1950	973	15,797,037	43,280	16,235
1951	1693	26,622,887	72,940	15,725
1952	2247	35,771,961	97,738	15,920
1953	2435	41,034,474	112,423	16,852
1954	2497	45,483,146	124,661	18,215
1955	2699	52,258,203	143,173	19,362
1956	2593	52,890,137	144,508	20,379
1957	2560	54,910,338	150,440	21,450

*July–December only

North pier under construction. The structure out at sea to the left marks the site of the head of the pier





The new distillation units

much new ancillary plant and additional storage capacity. The latter comprises sixteen tanks of various sizes for the storage of 2½ million barrels of crude oil and products, complete with all necessary interconnecting lines and pumps. New oil-blending facilities are also being installed.

The additional power, water supplies, and other facilities needed to meet the expansion are referred to elsewhere in this article.

At the time of the visit, the Kuwait Refinery Expansion Project was in full swing and proceeding according to schedule. Plant erection and all other facilities were engineered and constructed by Bechtel International Corporation (U.S.A.) in association with George Wimpey & Company Ltd (London). At least twenty locally-owned Kuwait contracting companies participated in these operations as sub-contractors. They supplied the bulk of the manpower which, during the peak period of construction, reached almost 4000 in number. British and American technicians to the number of about 250 were also employed on site.

The major part of the plant and equipment was purchased in the U.K. The operations involved the use of 30,000 cubic yards of concrete, 90 miles of pipe, 33,000 tons of steel, 140 miles of electric cable, and many miles of overhead power lines. Excavation of almost a quarter of a million cubic yards of earth was necessary.

Work on the preparation of the site commenced in August 1956. Since the visit reported here, the first of the new distillation units was brought on stream in January and the second in March.

The final stage of the expansion is due for completion at the end of 1958. Then the Kuwait refinery will have six times its previous capacity, and its daily output will be of the order of:

38,000	barrels	stabilized gasoline;
6,000	„	kerosine and aviation turbine kerosine;
20,000	„	gas oil;
20,000	„	marine diesel oil;
25,000	„	light bunker fuel oil;
80,000	„	heavy bunker fuel oil;
400	„	bitumen.

Leaded gasoline for the local market is produced in two grades—Regular grade and Premium grade—by blending treated straight-run gasoline with an imported blend product and tetra-ethyl lead.

Gasoline, gas oil, marine diesel oil, and light and heavy fuel oils will be exported in cargo lots after the demands for bunkering tankers and ships calling at Mina-al-Ahmadi have been met.

The kerosine will be utilized to meet local markets for burning and heating oils, while a special grade is being manufactured to supply a present small demand for aviation turbine fuel which is expected to increase materially. Kerosine will also be used to blend with fuel oils to satisfy specification requirements.

There is an expanding market for Premium grade gasoline in the area and for that purpose, a UOP Hydrobon Platformer is to be installed and is expected to come into operation in 1959. Installed capacity is to be 4000 barrels a day, although it is probable that in the initial operation this throughput will not be required.

Products of the enlarged refinery will be handled by a new pumphouse in which are installed ten Sigmund and five Stothert and Pitt pumps, all driven by Metropolitan-Vickers electric motors of varying horse-powers. Thirteen of these pumps will be used for the transfer of refined products to various loading points at the pier and submarine berths. Thus, submarine berth D will take marine diesel fuel, berths E and H light bunker fuel oil, berth B gasoline and gas oil, and the South Jetty marine diesel fuel and both grades of bunker fuel oil.

Control of these pumps will be from a new central control house in which are located tank gauges and the necessary electrical and electronic equipment.

At the formal opening of the refinery expansion. Seated (left to right) *A. S. Halford, C.M.G., H.B.M. Political Agent in Kuwait, H.H. The Ruler of Kuwait, Sheikh Sir Abdulla al Salim al Sabah, K.C.M.G., C.I.E., and C. A. P. Southwell, C.B.E., M.C., managing director of the Company*

H.H. The Ruler of Kuwait speaking at the opening ceremony

Formal Opening

The expanded refinery was formally inaugurated by His Highness Sir Abdulla al Salim al Sabah, K.C.M.G., C.I.E., Ruler of Kuwait, on 12 March. The Ruler was welcomed by C. A. P. Southwell, C.B.E., M.C., managing director of Kuwait Oil Company Ltd, and unveiled a bronze plaque at the entrance to the refinery buildings. The British Petroleum Company Ltd was represented by M. H. Lowson, and the Gulf Oil Corporation by Albert Gregerson.

WATER SUPPLY

Consequent upon the expansion of the refinery is a greatly increased need for cooling and other water.

To meet this need for water, all of which is drawn from the sea at a point within the boat harbour, the present water pumphouse is being reconstructed. Previously the installation consisted of four low-head 9167 gallons per minute Gwynnes pumps feeding the steam station and three high-head Gwynnes pumps delivering 2917 gallons per minute to the old refinery. These were driven by Crompton Parkinson motors.

The new pumphouse will contain three low-head Worthington pumps each capable of delivering 17,300 gallons per minute, driven by Metropolitan Vickers 400 hp motors at 418 rpm, and four high-head Worthington pumps each capable of delivering 20,420 gallons per minute driven by M.V. 600 hp motors at 487 rpm.

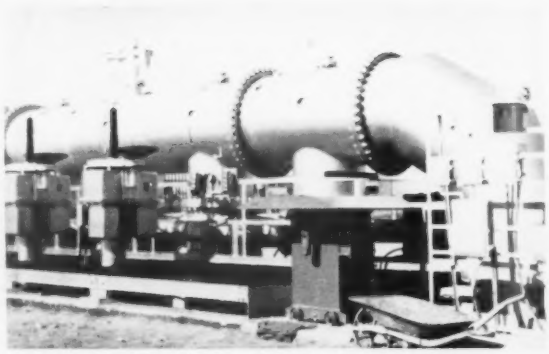
Although the suction pipes drawing the water from the sea will be of steel, it has been decided to eliminate the corrosion problem by using cement-asbestos for all delivery pipes. There are six of these lines, three 40-in diameter to the main steam power station, to provide cooling water required for the steam turbines and evaporator producing boiler feed and fresh water, two of 40-in diameter to the new refinery units, and one of 24-in diameter to the old refinery.

All these pipes are laid underground and, in order to protect them from damage by the passage of heavy vehicles on the surface, it has been made impossible for vehicles to traverse the pipe tracks except at selected points.

The 40-in lines from the sea water pumphouse being installed

POWER SUPPLIES

As already indicated, refinery and other expansions have made it necessary that the power supply be considerably augmented.



Distribution manifold for cooling water from the sea water pumphouse to the new refinery

Present generating equipment consists of three 7500-kW General Electric generators driven by condensing turbines. These are being augmented by two generators of similar capacity but driven by non-condensing turbines. Thus, total installed capacity will be 37,500 kW or, with four generators working and one in reserve, the working capacity will be 30,000 kW.

At present the steam-producing plant consists of five Babcock and Wilcox boilers each capable of evaporating 80,000 pounds of water per hour. To provide the additional steam required, three John Thompson boilers of 80,000 lb water/hour are being installed.

Exhaust steam from the non-condensing turbines will be passed to the evaporating plant which supplies not only the boiler feed water but also the full fresh-water needs of the area. This includes drinking and potable water for the needs of the staff at Ahmadi.

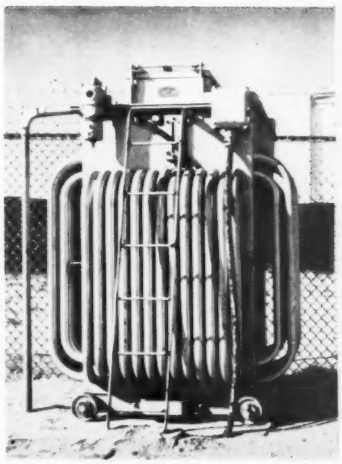
In addition to the water supplies dealt with above, comparatively large quantities of brackish water are needed for industrial and domestic purposes and for irrigation in Ahmadi. This water is obtained from wells at Abduliya, some 15 miles west of Burgan and piped to the town.

CORROSION PROTECTION

One of the most important problems in any industrial undertaking where metal structures are employed is to protect those structures from the ravages of corrosion. The subject of corrosion protection has been and is continually being given full attention in Kuwait and in the Company's office there is a very instructive exhibition of the effects of corrosion on steel, on cast-iron pipe, etc. It also shows how, although barnacles had destroyed the wrapping on an underwater line and bared the metal, corrosion had been prevented by cathodic protection.

One example of development in corrosion protection in which Kuwait Oil Company has been a pioneer is in

The small type of rectifier used in the cathodic protection of buried pipelines—



—and the larger machine installed at No. 6 gathering centre

connexion with the new cooling-water supply system already referred to. Although as far as possible asbestos-cement pipes have been used to avoid corrosion, some steel piping had to be employed.

Tests made in cast-iron pipe had shown that internal corrosion could be prevented by cathodic protection, but the equipment needed inside the pipe was excessive. It was found, however, that a silver-antimony alloy of lead used as the internal anode could materially reduce the size of the equipment. A contract was given to Cathodic Corrosion Control Ltd and over three hundred lead-alloy anodes are positioned in the approximate centres of the various lines in the system. The spacing of the anodes varies according to the diameter of the pipe, the smaller the diameter the closer being the spacing.

In the protection of the south pier rectifiers are connected to graphite anodes or scrap steel groundbeds located 300 to 400 ft from the structure out in the seabed. At the new north pier, all piles are hot enamel coated and the superstructure will be given four coats of chlorinated rubber paint after first being sandblasted. Cathodic protection will also be employed.

At the Tug Jetty, graphite anodes are suspended amongst the structure, a system which is permissible in a non-hazardous area. Also, there is no cable on the sea-bed to suffer damage. The ground bed of the Boat Harbour quay wall is outside the breakwater, through which the current passes.

In the protection of pipelines and tank-bases, both rectifiers and sacrificial anodes are employed, while many of the tanks for brackish and sea water are fitted with magnesium anodes suspended from wires across the top of the tank. The sea-water tanks in the expanded refinery are fitted with rectifier-fed lead anodes.

A number of the craft owned by the Company are cathodically protected externally and earlier resistance-controlled magnesium anodes are being changed to zinc. For the protection of buoy chains against corrosion near the mud line the use of anodes attached to the buoy itself is under trial.

Test are also being conducted on the cathodic protection of well casings and associated flow-lines. These tests are in progress at No. 6 gathering centre, where one rectifier is connected to the complete circuit of wells, flow-lines, and pipework in the Centre. There are indications that the system is proving successful.

STORES AND TRANSPORT

It needs but little thought to visualize the immense quantity and variety of stores required for such a vast undertaking as has been only briefly described in the foregoing account. Great as the problem is to-day, in the initial stages of the development it must have seemed almost insurmountable.

No doubt many interesting stories could be told of the way in which difficulties in this direction were overcome. Not the least of these difficulties was the provision of a building to provide protection for such stores and this at a time when everything was in short supply. It so happened that

Believed to be the largest store shed in any oil camp

at that time the huge hangar in Windsor Great Park, which had been used to house the King's Flight, had come into the market and the managing director of Kuwait Oil Company lost no time in procuring it for Kuwait. It is said that it cost £10,000 to dismantle it; and another large amount to re-erect it, apart from transport cost. However, it was an essential and so to-day Kuwait has what is reputed to be the largest single-span store shed in any oil camp.

However, this is not the only building needed to house the Company's stores—which from a quick survey were seen to cover not only every type of oil industry equipment but also practically every household requirement. In fact it was mentioned that the inventory totalled over 83,000 items from cots to coffins.

Another story which is told of the search for essential supplies in the early days relates to the need for medical equipment. It happened that in France there was a hospital still in its unopened cases just as it had come from America. It was bought and shipped to Kuwait, complete even to several hundred walking sticks.

Mechanical Transport

With a transport fleet that includes every type of transport vehicle from light cars to the heaviest oilfield trucks and special service vehicles, the most complete workshops must be available when all repairs have to be performed on site.

Kuwait Oil Company has, at Ahmadi, such a complete organization for the repair and maintenance of every type of mechanical transport vehicle. Facilities are provided for the complete overhaul of all engines at pre-determined intervals and, on occasion, for the fabrication of new parts when replacement spares are not available.

Air Travel

With the expansion of its activities to the more remote areas of Kuwait, it was considered desirable to provide more rapid means for the transport of men and materials to these areas. For example, travel by road to such places as Raudhatain or Mutriba could be time-absorbing and far from comfortable over the desert tracks, even though these had had some preparation for modern transport use.

So, in 1957, the Company decided to organize air transport and prepared an airstrip in close proximity to the headquarters at Ahmadi. Two Twin Pioneer aircraft were obtained on charter from BOAC and on 23 November 1957 the service was inaugurated with a regular schedule twice daily to Raudhatain and across to Mutriba when necessary. The service caters for personnel, small equipment, stores, etc. and is nicknamed "the milkround".

So useful has this service been that on 10 December 1957 it carried its one-thousandth passenger. Many of these passengers were Arabs who had never before been in the air —to-day they have become inveterate air travellers.

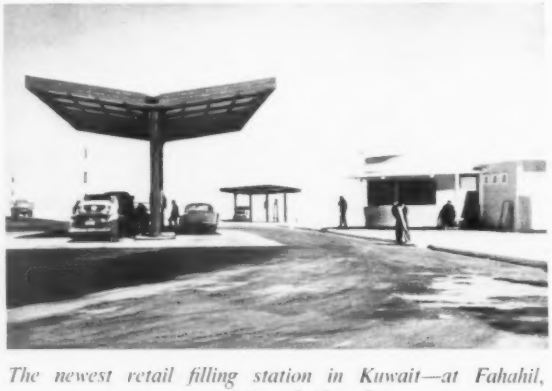
MARKETING OF PRODUCTS

At the end of 1947 there were about one thousand motor vehicles in the State of Kuwait. By the end of 1957 this figure had risen to twenty thousand and coupled with the development of motor roads, has brought about a corresponding increase in the demand for petroleum products.

The Company has a number of public sales filling stations for the retail distribution of gasoline, kerosine, gas oil, and lubricating oils. These are located in Kuwait Town and its suburbs and at Ahmadi, Fahahil, and Jahrah.

Most of the filling stations have eight pumps, four for Premium grade and four for Regular grade gasoline, with in some cases additional pumps for kerosine and gas oil.

The largest station at present is at Naif Gate in Kuwait Town which has five pumps for Premium grade gasoline and five for Regular, as well as two pumps on kerosine. The general practice is to have a 6000-gallon underground storage tank for each product and these are supplied by road tanker from two depots, one situated at Shuwaikh to serve Kuwait Town and its suburbs, and the other at Ahmadi. Main products are pumped from the refinery to these two depots.



The newest retail filling station in Kuwait—at Fahahil, near Mina-al-Ahmadi

A product for blending to make Premium grade gasoline is now being imported, but when the Platformer is in operation, this grade will be wholly produced in Kuwait.

Prices are of interest, Premium grade being 81 pice (1s 1d) per Imperial gallon and Regular grade 56 pice (10d). Kerosine is 37 pice (6½d) per Imperial gallon. Lubricating oil is Rs. 4·50 (6s 9d) per gallon, Rs. 1·12 (1s 8d) per quart, and 62 pice (11¾d) per pint.

The Editor is particularly grateful to the many members of the staff of Kuwait Oil Company Ltd, both in Kuwait and in London, who gave so much of their time to ensure that he was able to obtain an insight into the operations of the Company.

★ ★ ★

MIDDLE EAST OIL PRODUCTION

	Feb.	*Jan.–Feb.*
	Tons	
Iraq Petroleum Co. Ltd ...	1,310,736	2,835,426
Basrah Petroleum Co. Ltd ...	818,466	1,698,752
Mosul Petroleum Co. Ltd ...	99,754	212,988
Qatar Petroleum Co. Ltd ...	579,077	1,205,247
Iraanse Aardolie Exploratie en Productie Mij	2,836,000	6,302,000
Kuwait Oil Co. Ltd	5,074,101	10,584,583
	Barrels	
Arabian American Oil Co. (Saudi Arabia)	29,763,970	60,094,386
Trans-Arabian Pipe Line Co. (Sidon, Lebanon)	10,281,084	19,380,939

The refinery throughput at Abadan of the Iraanse Aardolie Raffinage Mij for February was 1,132,000 tons, the total for 1 January to 28 February being 2,407,000 tons.

Crude processed at Aramco's Ras Tanura refinery for February was 5,087,156 brl, the total for 1 January to 28 February being 10,863,084 brl.

Notes of the Month

New ASTM Committee on Solvents

The American Society for Testing Materials is to increase its activity in the organic solvents field by establishing a new committee, D-26, on halogenated organic solvents.

An organizing committee, under the chairmanship of M. A. Pinney of the Pennsylvania Railroad, is undertaking preliminary work and the new committee will be formally organized at the Annual Meeting of the Society during the week of 22–27 June.

The scope of the new committee has been recommended as "The promotion of knowledge pertaining to halogenated organic solvents and admixtures thereof including formulation of specifications, definitions, and methods of test". Standards peculiar to electrical insulating liquids, paint thinners, and non-halogenated components of admixtures normally are excluded from the scope of committee D-26.

It will concentrate on solvents containing halogens, *i.e.*, chlorine, fluorine, etc., including trichloroethylene, perchloroethylene, and solvent mixtures of these halogenated solvents, together with other types of organic solvents.

Sub-committees are proposed covering definitions and nomenclature, vapour degreasing, cold cleaning, test methods, and industrial hygiene and safety.

The ASTM welcomes participation by companies interested in this new committee and further information may be obtained from F. Y. Speight, ASTM, 1916 Race Street, Philadelphia 7, Pennsylvania, U.S.A.

Three-fold Rise Estimated in the Supply of U.K. Chemical Engineers

In less than 10 years it is estimated that Britain could provide annually a more than three-fold increase in her supply of new chemical engineers. This encouraging forecast, which exceeds the minimum envisaged by the Government in 1956 for engineers and scientists as a whole, is based on replies received by the Institution of Chemical Engineers to a questionnaire sent to professors of chemical engineering and principals and heads of departments of technical colleges.

Such an increase is necessary since the growth rate of the chemical and allied industries, at 7–8 per cent, is nearly double that of the annual rate for all industries. The Government in "Scientific and Engineering Manpower in Great Britain", published by HMSO in 1956, calculated that by 1959 2200 chemical engineers will be needed. This represents a 47 per cent increase over the number employed in 1956.

Although the replies received by the Institution of Chemical Engineers indicate that potentialities exist for achieving an output of over 900 qualified chemical engineers a year there is much to be done. The extent of the problem can be gauged from the figures for 1953 when 203 persons qualified and for 1956 when the number was 277.

The Institution of Chemical Engineers concludes that there is justification for more interest and support, particularly in the provision of student apprenticeship schemes and the seconding of qualified men from industry to teach for periods of not less than 6 months.

Iranian Oil Operating Companies' Review of 1957

Crude oil production in the Consortium Agreement Area of Iran in 1957 set an all-time record of 34,800,000 tons, which exceeded the 1956 total by one-third. Payments to Iran totalled £76 million ($213 million). Refinery throughput at Abadan rose in 1957 by 4 million tons to 15,200,000 tons.

Those are outstanding facets of the annual review of operations issued by the Iranian Oil Exploration and Producing Company and the Iranian Oil Refining Company, which operate the oilfields in southern Iran and the Abadan refinery on behalf of the National Iranian Oil Company and the seventeen British, American, French, and Anglo-Dutch companies known as the Consortium.

A special chapter is devoted to the project for development of the Gach Saran oilfield to raise production capacity from the present 48,000 b.d. to 450,000 b.d. and for a new tanker terminal at Kharg Island. At Agha Jari, the most productive field in Iran at 450,000 b.d., the construction of an additional gas/oil separation production unit and a new 16-in–20-in pipeline to Bandar Mashur, where two new jetties are being completed, will raise capacity to some 600,000 b.d. For these developments and associated housing and welfare programmes, £50 million ($140 million) has been allocated in 1958 and subsequent years.

1958 Programme

Exploration work in the current season is being carried forward by eight field parties. These comprise two geological, three topographical, and three geophysical teams, who are working in the sub-coastal strip, approximately 50 miles deep, stretching over 800 miles from Ahwaz to the southern end of the Agreement Area at Bandar Abbas.

The 1958 drilling programme calls for one rig at Naft Safid and three each at Agha Jari and Gach Saran, all engaged on exploitation wells. Two rigs will carry out exploration drilling at Ahwaz and at Kuh-i-Binak near the Persian Gulf coast, north of Kharg Island.

Refining

At Abadan throughput in 1957 reached an average of 314,000 b.d. The exceptionally large increase in throughput was partly due to the Suez crisis which for some months early in the year reduced the output of several refineries which normally compete with Abadan in the world market. Refining operations were again designed for a maximum yield of aviation gasoline and middle distillate.

Staff and Labour

In accordance with Iranian law, there was a review of wage rates by representatives of the Iranian Government, the National Iranian Company, the operating companies, and the labour force. The result has been an increase of approximately 20 per cent in the wages for all labour classifications.

During 1957 684 houses for the labour force and 202 for the staff were completed, while a further 1000 houses were under construction at the end of the year.

In an expansion of the training programme, scholarships were set up to cover the entire expenses of 32 students at Teheran University, and 30 members of the Iranian staff were given advanced training at installations outside Iran.

Scottish Lurgi Plant to Make Gas from Low-grade Coal

"Scotland's gas industry has entered a new era." With these words, Sydney Smith, chairman of the Scottish Gas Board, announced the Board's intention to build Britain's first Lurgi high-pressure complete gasification plant at Westfield, Fife.

This plant permits production of gas from low-grade coal containing up to 25 per cent ash and 16 per cent moisture, which is unsuitable for normal carbonizing plant. At Westfield open-cast coal will be supplied by conveyor belt direct from a nearby National Coal Board site.

The plant will be erected in two stages, the first of which, expected to be completed in July 1960, will give a capacity of 15 million cu. ft a day. This will be doubled two years later when the second stage is completed. Total cost of the plant and high-pressure grid mains to serve the area is estimated at £8,454,000 and work is expected to begin in June.

The main contractors are Humphreys and Glasgow Ltd who, in association with the Power-Gas Corporation, have reached agreement with the Lurgi Company of Germany to build the £6½ million Lurgi plant in Britain.

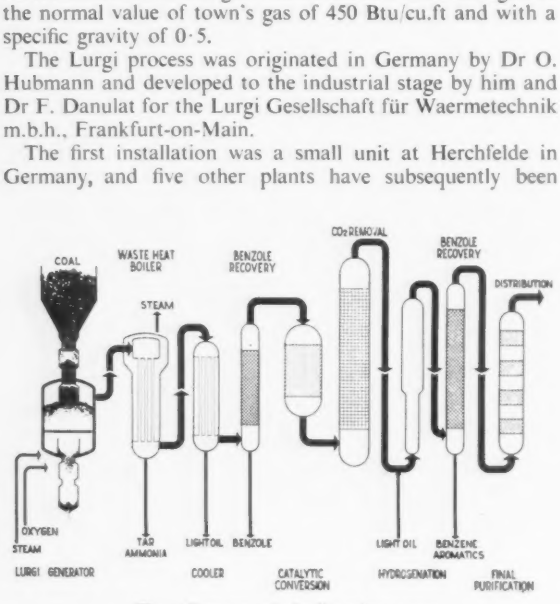
The coal will be completely gasified in the Lurgi generators at a pressure of about 25 atmospheres in a continuous stream of oxygen and superheated steam, and gas will leave the plant at a pressure of over 250 psi. Heat from the crude gas from the generators will raise steam in waste-heat boilers. Tar, oils, and ammonia in the effluent will be recovered, the ammonia being concentrated in a plant to produce a 20 per cent solution for sale. Benzole will also be extracted from the crude gas.

The gas will be enriched by hydrogenation of oil, using a process developed by Dr F. J. Dent, director of the Gas Council's West Midlands Research Station.

Crude gas from the Lurgi generators will have a calorific value of about 300 Btu/cu.ft which, after washing in a Benfield plant, will be increased to about 400 Btu/cu.ft. Hydrogenation will enrich this to about 700 Btu/cu.ft, and before distribution the gas will be diluted with nitrogen to the normal value of town's gas of 450 Btu/cu.ft and with a specific gravity of 0·5.

The Lurgi process was originated in Germany by Dr O. Hubmann and developed to the industrial stage by him and Dr F. Danulat for the Lurgi Gesellschaft für Waermetechnik m.b.h., Frankfurt-on-Main.

The first installation was a small unit at Herchfelde in Germany, and five other plants have subsequently been erected. Of these two are in Germany, one in Czechoslovakia, one in South Africa, and one in Australia.



Flow diagram of the Lurgi process

Hydraulic Fracturing Increases Texas Oil Yields

Hydraulic fracturing—a comparatively new oil-well completion technique—is credited with increasing crude petroleum output in North Texas by more than 1 million barrels during a recent two-year period, according to a recent U.S. Bureau of Mines report.

The process was patented by the Pan American Petroleum Corporation (formerly the Stanolind Oil and Gas Co.) and was first applied commercially in 1949. A liquid, such as oil or water, is pumped into a well under enough pressure to fracture the surrounding rock. The resultant cracks are held open by injecting sand with the liquid, which allows the oil in the reservoir to drain more freely into the producing well.

In the Strawn formation in North Texas use of fracturing increased oil recovery by 7000 barrels during the period for the average well, and by 4600 barrels for the average well in the Cisco formation. Average monthly production from Strawn wells during the first six months after treatment was 2½ times greater than before fracturing.

Employment Record Set by Aramco Saudi-Arabian Employees

The Saudi-Arabian employees of Aramco have achieved an outstanding record of steady employment. The Company's 12,729 Saudi-Arabian employees, at the end of 1957, had worked for an average of 7·3 years, compared with a continuous service average of 6·5 years at the end of 1965.

At least 20 years' service has been completed by seventy-two Saudi-Arabians, who joined the Company before the discovery of oil in the area in March 1938.

Only 12 per cent have worked for the Company for less than 2 years, 41 per cent for between 5 and 10 years, and 28 per cent for more than 10 years.

To-day Saudi Arabs comprise approximately 70 per cent of Aramco's total labour force in Saudi Arabia. The balance is almost equally divided between United States citizens and those of sixteen other nations. The proportion of Saudi-Arabian employees has been rising steadily for a number of years.

Consumption of Synthetic Rubber in Europe

By 1960 it is estimated that consumption of synthetic rubber in Europe will account for between 42 and 71 per cent of total consumption and production will reach 371,000 tons. To achieve the 71 per cent consumption figure, about 250,000 tons of synthetic rubber would have to be imported from North America.

These forecasts were made by A. J. Pickett, editor of *The Rubber and Plastics Age*, at a meeting on "The Commercial Impact of Synthetic Rubber", held recently in New York.

Mr Pickett also stated that Western Europe was already importing about 200,000 tons of synthetic rubber annually, and Britain's share of this was over 50,000 tons. Of the world rubber consumption of 4 million tons expected by 1956, over half would be supplied as synthetic. If this proportion was greatly exceeded there would be a world surplus of natural rubber.

Off-Shore Oil Supply Line

A BP photograph

BP Tanker Company's 16,000-*ton tanker* British Vigilance *discharging crude oil from Banias at a special loading and discharging platform situated three miles off-shore from Ravenna, Italy, on the Adriatic. This platform is connected by a submarine pipeline to Sarom Refinery, Venice, which is jointly owned by the British Petroleum Company and Azienda Generale Italiana Petroli*

Australian Refineries Throughput up 11 per cent

The Australian Minister for National Development, Senator the Hon. W. H. Spooner, has recently stated that Australian petroleum refineries processed 8,640,000 tons of crude oil in 1957, an 11 per cent increase over the 1956 total. Motor spirit output provided 83 per cent of local requirements after deducting exports. The refineries were able to meet the full local demand for fuel oil, industrial diesel fuel, and automotive diesel fuel.

Australian consumption of motor spirit increased 4 per cent to 980 million gallons (3·2 million tons). The 1956 trend towards a reduction in the use of premium-grade motor spirit was reversed in 1957 when 38 per cent of all motor petrol sold was of premium grade. In the last 3 months of 1957 the proportion rose to 40 per cent compared with 35 per cent for the same 3 months of 1956. The quantity of premium spirit sold in 1957 increased by 6½ per cent over 1956 sales, but standard petrol increased by less than 3 per cent.

With the exception of automotive diesel fuel and aviation turbine fuel, the rate of growth in the consumption of petroleum products generally showed a significant decline from the previous year.

The decline in the rate of growth of consumption was most marked with fuel oil. Annual consumption of this product, including inland usage and consumption in ships' bunkers, increased from 1·05 million tons to 2·2 million tons between 1953 and 1956; the 1957 consumption was only 2·3 million tons. Of this 1·23 million tons represented inland consumption, an increase of only 8·5 per cent in 1957 over the previous year, compared with a corresponding increase of 30 per cent in 1956 and 38·8 per cent in 1955. There was no increase last year in the consumption of fuel oil in ships' bunkers.

Despite the introduction in September last of an excise tax of 1s. per gallon on automotive diesel fuel used in road vehicles, the increase in consumption in 1957 remained constant at 15 per cent. The continuation of the diesel locomotive construction programme by the railways was doubtless a major factor in maintaining the consumption rate of this product.

Aviation turbine fuel consumption totalled 100,833 tons in 1957, an increase of 32 per cent over 1956. This reflects the increasing use of turbine-engined aircraft.

Australia exported 875,000 tons of petroleum products in 1957, 56 per cent of which went to New Zealand. This country took almost all of the 108,000 tons of motor spirit Australia exported in 1957.

Gas Chromatography Discussion Group

The Gas Chromatography Discussion Group was formed in association with the Hydrocarbon Research Group of the Institute of Petroleum following the Symposium on Gas Chromatography held in London in May 1956 and has the following objects:—

(1) To promote interest in gas chromatography.

(2) To organize meetings devoted to gas chromatography.

(3) To compile and distribute gas chromatographic data.

The expanding interest shown in the activities of the Group over the past year has necessitated some changes in the present organization. It is proposed to invite workers interested in the field to become members of the Group and to contribute to the planning and execution of its work in the future. The annual subscription will be 1 guinea which will entitle members to vote at General Meetings, attend the informal symposia organized twice yearly, and receive such compilations of data or other information as may become available from time to time.

The first Annual General Meeting will be held in London in the Autumn of 1958 in conjunction with the next informal symposium.

Application forms for membership may be obtained from the secretary, D. H. Desty, The British Petroleum Company Ltd, Sunbury-on-Thames, Middlesex.

Launch of French Tanker

A BP photograph

On 8 *February the* 33,000-*ton tanker* Chaumont, *built for The British Petroleum Company's French associate, Société Française des Pétroles BP, was launched at Dunkirk by Madame Massigli, wife of the former French Ambassador in London. The photograph shows the* Chaumont *prior to her launch*

Surveying in Antarctica

Geoffrey Pratt preparing for the day

Geoffrey Pratt, one of the British Petroleum Company's geophysicists who was seconded to the Trans-Antarctic Expedition and accompanied Dr Fuchs from the Weddell Sea to the South Pole and on to Scott Base, has cabled a brief report of his seismic and gravity observations.

Very little trouble was experienced with either the 12-channel reflection unit seismic equipment or the gravimeter.

From the South Ice base to Midway depot Mr Pratt established 29 seismic and 135 gravity stations at average spacings of 43 and 9 miles respectively. Gravity readings were taken when stops were made by the expedition to carry out a general survey of the immediate area, while seismic shots were exploded at suitably spaced overnight camps. Quadruple geophones were used, the spread being 330 m. Where ice was thick, a 10-lb shot was exploded in an 11-m deep hole. In thin ice the shot was divided between three surface pits.

"Seismic ice thickness", he reports, "range from 1000 to 8000 ft, with the bottom probably always above sea level. On the Weddell Sea side of the South Pole the land surface is typically 1000 to 3000 ft above sea level, but with several ridges rising to a maximum height of 7000 ft. For a distance of 25 miles on either side of the Pole the ice is very much thinner than at the Pole itself, and remains thin for a long distance on the Scott Base side.

"Occasional crevassed areas, apparently on top of peaks, are covered by only 1000 ft of ice."

Present uncertainty about the heights of the recording stations made interpretations of the seismic work very rough, but the results were generally confirmed by the gravimeter readings, although the roughness of free air corrections weakened this support. Mr Pratt concludes that the record quality is acceptable by Antarctic standards.

Sale of Shell and BP Marketing Interests in Israel

The Shell Company of Palestine Ltd, which distributes and markets petroleum products in Israel and is jointly owned by the Royal Dutch Shell and BP groups, has been purchased outright by an U.K. investment company, Iwol Investments Ltd, formed for this purpose by a group of investors. Mr Isaac Wolfson is chairman and the formal transfer of the company to the new owners was completed on 1 April.

The assets include a storage installation at Haifa, bulk-oil depots at Tel Aviv, Jerusalem, and Beersheba, and about 50 service and filling stations together with distributing equipment, such as pumps, tanks, and road vehicles.

Aramco Completes Two Wildcats

The Arabian American Oil Company has completed two wildcat wells in which oil was discovered last autumn. One, Manifa No. 1, was drilled in the Persian Gulf 8 miles off the shore of Saudi Arabia. The other, Khurais No. 1, was drilled on land 90 miles north-east of Riyadh, the capital of Saudi Arabia.

Manifa No. 1 has been completed through perforations from 7615 to 7800 ft and from 7810 to 7865 ft in the Yamama formation, which has been identified as Lower Cretaceous. The well was drilled to a total depth of 9637 ft and plugged back to 7892 ft. This is the first well to have discovered oil production in Aramco's concession area from the Yamama formation, which lies above the Arab Zone, the principal producing zone in Aramco's onshore fields.

The crude oil from the producing interval at Manifa No. 1 is sour and has an API gravity of approximately 26°. Initial tests have indicated the Yamama formation to be highly prolific in this well.

Khurais No. 1 has been completed for production from the Arab-D member and from the upper part of the Jubaila formation, both of which are of Upper Jurassic age. It was plugged back to 4975 ft after reaching a total depth of 10,621 ft.

The crude oil from Khurais No. 1 is sour and has an API gravity of approximately 33°. Initial tests have indicated flowing rates of approximately 3000 to 4000 b.d.

New Type Repair Trucks for Venezuelan Oilfields

First of their kind to be made in the United Kingdom, two mobile workshops, with radio cabin and aerial, were shipped recently to Compania Shell de Venezuela for use by oilfield workers.

Mounted on Commer 3-ton l.w.b. chassis, the bodies, which cost about £1250 each, were made to the design of Shell engineers by O. G. Lywood Ltd, Hayes, Middlesex. The vehicles will be used by skilled men, in radio communication with their base camp, for emergency repairs by day or night to wells and oilfield installations.

Each truck has two compartments. The forward one is fitted with a sliding door, foam-rubber seating, and a handrail for the crew, and also has a steel table and loose chair for the radio operator. A light-alloy aerial mast is fixed to the outside corner of the truck.

The rear compartment is boarded on the lower parts of the sides, and has an open space above. It contains switchgear and a large toolbox, bolted to the floor; two more toolboxes are slung beneath the subframe, together with a tank to hold gasoline for cleaning purposes.

Long lengths of pipe can be carried by a ducting at floor level which extends through the partition to an access flap in the front bulkhead, and a 6-inch engineers' vice on a sliding draw-out support allows the manipulation of long pipes across the rear of the body.

The Pipeline Industries Guild First Annual Dinner

The First Annual Dinner of the Pipeline Industries Guild was held in the Connaught Rooms, London, on 11 March, under the chairmanship of J. W. Jones, of Constructors-John Brown Ltd. The many distinguished members and guests included Martin T. Flett, C.B., (Deputy Secretary, Ministry of Power) and T. Mervyn Homes (chairman, Wales Gas Board).

Martin T. Flett, C.B., who proposed the toast "The Guild", said he believed the pipe was one of the fundamentals which distinguished man from the beast, and the man who had first hollowed out a tree-trunk to carry water deserved as much gratitude from humanity as his fellows who discovered or invented the wheel. Nowadays there was practically nothing that could not be carried efficiently, economically, and expeditiously through a pipe, and the pipeline constructor was the real frontiersman of our time.

More exciting, in a way, because it was such a new development, was the prospect of carrying coal by pipeline. His Ministry was co-operating with the National Coal Board in a series of experiments on the hydraulic transport of coal which had already produced a working line at Markham Colliery carrying 3-in lumps of coal a distance of some 300 yd. It would solve a lot of problems if we could add that new weapon to our armoury.

Speaking of gas, he said that pipelines for gas opened up the prospect of a national gas grid and, perhaps, a permanent successor to PLUTO in the form of a trans-oceanic pipeline bringing to British shores the natural gas of the Middle East or the Western Hemisphere.

The chairman, in responding, said the occasion was unique as it was the first time in Britain that there had been a gathering of pipeliners at a dinner specifically organized for pipeliners.

Pipeliners were a very distinct branch of the engineering fraternity. In Britain modern pipelining was a comparatively new industry. Until recently it had been the virtual monopoly of our American friends, who had developed laying techniques and equipment which made it possible to lay long-distance lines at high speed. From their know-how we had made rapid progress during recent years, and now had in Britain an ever-growing number of people with a wide knowledge of the art of pipelining.

Captain J. W. Esmonde, O.B.E., D.S.C., proposed the toast "The Guests", and H. R. Lupton, O.B.E., M.C. (past-president, Institution of Water Engineers) responded.

Platforming—Unifining Unit on Stream at DEA Heide Refinery

A combination UOP platforming-unifining unit, which includes gas concentration facilities for producing LPG, has gone on stream at the refinery of Deutsche Erdol-Aktiengesellschaft, Heide, Germany, as part of an expansion programme which began shortly after the refinery was rebuilt following world war II.

The unit is designed to handle either a 50–50 blend of Heide-Arabian crudes boiling in the range of 210 to 355°F, or a blend of 80 per cent Heide crude and 20 per cent Arabian. The unifining unit is serving as a pretreater for the platformer, which is designed to produce a 95 F-1 clear octane blending component. Initially operating at a capacity of 2000 b.d., the platformer eventually will be operated at a 4000 b.d. design capacity.

The platformer is the sixth operating in Germany. It was constructed by Procon (Great Britain) Ltd in co-operation with Edeleanu Gesellschaft m.b.H., Frankfurt/Main, and was designed, engineered, and licensed by Universal Oil Products Company, Des Plaines, Illinois.

Austrian Pipeline Contract for U.K.

A £1½-million contract has been awarded to Constructors John Brown Limited for construction of natural gas pipeline system in Lower Austria by Niogas, Niederosterreich Gasvertriebs AG, the Lower Austria organization responsible for gas distribution.

The system will cover a total of 160 miles and the constructors will use the technical services of their American associates, Williams Bros of Tulsa, Oklahoma. Austrian sub-contractors will carry out a considerable part of the work and Austrian labour and equipment will be used.

The system will carry natural gas of high calorific value from sources at Bockfliess, just north of Vienna, and Schwechat, south-east of the city, to two areas. A western section will serve the Danube basin above Vienna and such centres as St Polten and Krems. A southern section will cover places such as Wiener Neustadt and will extend as far as the Semmering Pass near the boundary of Lower Austria and Steiermark. The system to be constructed will be extensions to an existing 55-mile network installed by Niogas.

The pipeline will range from 12 to 6 inches in diameter with a high proportion of 12- and 10-inch sections. Gas, cleaned and dried before being supplied, will flow through the pipeline at a maximum pressure of 900 p.s.i.

Esso Develops Mammoth Pipeline Meter

Esso Research and Engineering Company recently completed a successful year-long test on what is believed to be the world's largest positive-displacement pipeline meter.

The meter can measure 10,000 brl of oil per hour (120 gal/sec), which is four times greater than the largest meters previously employed.

Esso mammoth meter

The meter avoids the necessity for tanks used to gauge oil pumped from producing fields to refineries or tankers, and is accurate to 0·1 per cent.

During its year-long test, conducted in Louisiana by Interstate Oil Pipe Line Company, the meter passed more than 60 million brl of oil.

Development of the device was carried out jointly by Esso Research and Interstate Oil Pipe Line, both affiliates of Standard Oil Company (New Jersey), and A. O. Smith Corporation, Los Angeles.

A Shell photograph

A drawing by Lawrence Wright, M.A., A.R.I.B.A., of the modified design of the twenty-six storey tower block in the new main offices in London for the Royal Dutch Shell group

Careers in the Oil and Petroleum Chemicals Industries

Character rather than crammability is the attribute most valuable to a young man seeking success in the oil industry. This opinion is expressed in an article on employment opportunities in the oil and petroleum chemicals industries that forms part of a recent survey on careers published by *The Financial Times*.

The industry provides openings for many different skills and three broad divisions of its activities are mentioned—scientific and technological, administrative, and marketing. There is much interchange between the sections so that a specialist in one subject must also know something of the problems encountered by his colleagues in other fields.

To a young man with ability and keenness, responsibility with its appropriate financial reward comes quickly in any branch of the industry and promotion prospects to the top ranks are good.

In addition to the steady and obvious demand for graduates in science, chemistry, and engineering, where the industry competes for candidates with many other rivals, there is a smaller demand for arts graduates. Industrial relations, personnel management, and public relations are fields where the arts graduate can be employed and a knowledge of French, Spanish, Arabic, or Portuguese is a useful secondary qualification.

The author concludes that overseas service for an oil company, although often in wild and inaccessible places, forms the best road for a good job at home—and that in this rapidly expanding industry there are a lot of good jobs at home.

New Overland Record from Norway to Capetown

Driving on icy snowbound roads of Europe, over the desert tracks of the Sahara, and through the sand and gluey mud of tropical Africa, three standard Renault vehicles recently completed a record trip from the North Cape of Norway to Capetown in 16 days 7 hours. Throughout the journey the three vehicles, which were a Fregate Transfluide, a Domaine, and a 4 × 4 Tous Terraine, used BP Visco-Static engine oil and BP chassis lubricants and transmission oils.

The team of twelve French army officers and N.C.Os was led by Colonel Debrus and left Karasjok, in the extreme north of Norway, on 26 January and reached Capetown on 11 February.

The test was sponsored by the French Armed Forces Sports Service with the co-operation of the National Administration of Renault factories and BP. Among its objectives were to allow the French Armed Forces Sports Service to study the behaviour of a group of men specially trained for such conditions and to confirm the quality of the materials used in the Renault range.

International Conference on Co-ordination Chemistry

Sponsored by the International Union of Pure and Applied Chemistry and organized by the Chemical Society, the next International Conference on Co-ordination Chemistry will be held in London from 6-11 April 1959.

The conference will mainly be concerned with recent developments in the co-ordination chemistry of carbon and the use of carbonyls, organo-metallics, hydrides, etc, as reagents and catalysts; the theory and physical chemistry of co-ordination compounds; the complex chemistry of less common ligand atoms; and metal complex compounds.

Further details may be obtained from The Secretary, International Conference on Co-ordination Chemistry, The Chemical Society, Burlington House, London, W.1.

R. B. McArthur (left), *manager, BP Clyde Tanker Co. and Captain G. C. Dobson, master,* Clyde Inventor, *inspecting the new house flag of BP Clyde Tanker Company on board the* 12,000-*ton tanker* Clyde Inventor, *which was the first ship of the recently formed company to fly the new flag*

The Gas Council's Midlands Research Station Opened

Currently under investigation at the Gas Council's Midlands Research Station at Solihull, which was officially opened on 1 April, are five methods of gas manufacture. Development of these is being carefully planned so that the methods, when proved, may be introduced to the British gas industry as smoothly as possible. Brief details of the processes are given below.

The first is the Lurgi high-pressure method for gasification of low-grade coal. Details are given in this issue on p. 160 of the first Lurgi plant in Britain at Westfield, Fife, Scotland. In this process two methods of obtaining gaseous hydrocarbons for enrichment have been developed—by catalytic synthesis from carbon monoxide and hydrogen, and by the hydrogenation of oil which is cheaper.

The second process is gasification with slagging gasifiers which operate at very high temperatures and require the ash to be withdrawn as slag. This type of gasifier is still under test; so far trials have been with coke, and the gasifier has yet to be adapted for coal. The process provides high output, a saving of process steam, and reductions in by-product recovery costs.

The third process, which has an overall thermal efficiency of 75 per cent, is the fluidized coal process which can deal with any size of coal down to dust. It incorporates the hydrogenation of the coal itself and is thought to be the best method for by-product recovery and gas enrichment.

The fourth method, that for pressure gasification of oil, is based on the Gas Council's process of oil hydrogenation and has two versions. One is for distillate oils which can be vaporized and purified before entering the reaction vessel and the other for heavy fuel oils and crude oils. No oxygen is required in the process, the thermal efficiency is 80 per cent, and high yields of benzene are produced as a by-product. The distillate-oil version is to be installed by the South Western Gas Board.

The fifth process has been developed for peak-load purposes. By foregoing recovery of by-products a high thermal efficiency of 85 per cent can be obtained. The process is known as the pressure catalytic process for light distillate oils, and it can be adapted to run on materials such as methanol, if oil supplies are restricted. Commercial installations of this process are being considered by area Gas Boards.

The Shell-Mex and B.P. stands at the Ideal Home Exhibition were devoted entirely to "Oil Fuel at Home". Units of all types to suit every purpose from temporary to continuous heating, and the provision of constant hot water, were on display. A large staff was in attendance to give advice on domestic heating problems

Waverley Gold Medal Essay Competition

The Waverley essay competition was first organized by the Scientific Advisory Board, under the chairmanship of the late Lord Waverley, in 1953.

The medal and £100 are awared for the best essay of about 3000 words based on some recent scientific research or new development (whether the author's work or not) giving some indication of the scientific background, the experimental results, and its potential application in industry.

Details can be obtained from the Editor, *Research*, 4–5 Bell Yard, London, W.C.2.

OIL COMPANIES' EQUIPMENT ORDERS

During the last quarter of 1957 orders for materials and equipment placed in the United Kingdom by oil companies were valued at £32,764,726, according to figures compiled by the Oil Companies Materials Secretariat and issued by CBMPE.

Total value of the orders for the quarter declined by £2,527,733 compared with the third quarter of 1957. There were decreases in the following nine groups: specialized equipment for oil refineries; railcars, road tankers, aircraft refuellers, etc.; drums, drumsheets, and tinplate; tankage; tubulars, pipe fittings, and valves; pumps; laboratory equipment and chemicals; cement and other building materials; and commissary and general requisites. There were increases in all other groups, compared with the figures for the third quarter.

Total figures for all items for the 12-month periods during the past three years are: 1957, £134,050,283; 1956, £153,730,621; and 1955, £123,524,788.

	1957 *Oct.–Dec.*
Geophysical and other exploratory equipment, etc.	21,836
Specialized equipment for oil drilling and production including oil casing, tubing, etc.	5,174,965
Specialized equipment for oil refineries, etc. (not including pumps and valves)	597,205
Drums and can-making, filling and cleaning equipment, kerbside pumps, and other metering and dispensing equipment, etc.	284,402
Railcars, road tankers, aircraft refuellers, etc. ...	33,941
Drums, drumsheets, and tinplate	1,039,450
Tankage (including tank fittings)	1,544,585
Tubulars, pipe fittings, and valves (ferrous and non-ferrous)	4,752,690
Pumps, (excluding slush, oilwell, and kerbside) ...	418,736
Boilers, boiler-house plant, and accessories, etc. ...	59,433
Electrical equipment—motors, generators, transformers, etc.	2,578,857
Instruments, meters, and gauges, etc.	425,440
Prime movers and compressors	694,035
Machine and hand tools, welding and miscellaneous machinery, and stores	2,501,524
Ferrous and non-ferrous plates, sections, sheets, and bars	1,856,882
Automotive equipment, all types	1,295,981
Laboratory equipment and chemicals including hospital and medical supplies	223,578
Bulk chemicals, catalysts, barytes, etc.	6,480,401
Cement and other building materials, and hardware, including timber	1,117,518
Commissary, general requisites for office, warehouse, household, club, and sports, etc. ...	1,663,267
	£32,764,726

British Enterprise in the Persian Gulf

A new "island", not marked on the maps, but which may be of great significance to the oil industry, has recently appeared in the Persian Gulf.

A BP photograph

A view at sunset of Adma Enterprise *at the site of ADMA well No. F.1 in the Persian Gulf*

The "island" is a mobile drilling platform from which Abu Dhabi Marine Areas Ltd (ADMA) is drilling its first offshore well on the Trucial Coast off the Sheikdom of Abu Dhabi at the southern end of the Persian Gulf. ADMA, in which the BP Company has a two-thirds shareholding and the Compagnie Française des Pétroles one-third, has engaged BP Exploration Co. as its operating agency.

In 1953 Sheikh Shakbut bin Sultan bin Zaid, Ruler of Abu Dhabi, granted ADMA a concession to explore for oil over some 1200 square miles of the waters of the Gulf. After extensive surveys, which included a geological survey of the ocean bed, ADMA decided to drill in the area. Preparations involved construction of a drilling platform and creation of a servicing base, administrative centre, and rest camp.

Drilling platforms in use in America were studied and finally an order for a self-elevating platform of American design was placed with a West German company.

In August 1957 the 4000-ton *Adma Enterprise*, as the platform had been named, was towed down the Kiel Canal, and 92 days later, after a 6800-mile voyage, she reached Das Island. Early this year she was towed to her drilling location, some 20 miles from the island, and the company's first well began drilling on 14 January.

In addition to the 140-ft drilling rig the barge has a landing platform for the helicopters that bring men and stores from Das Island.

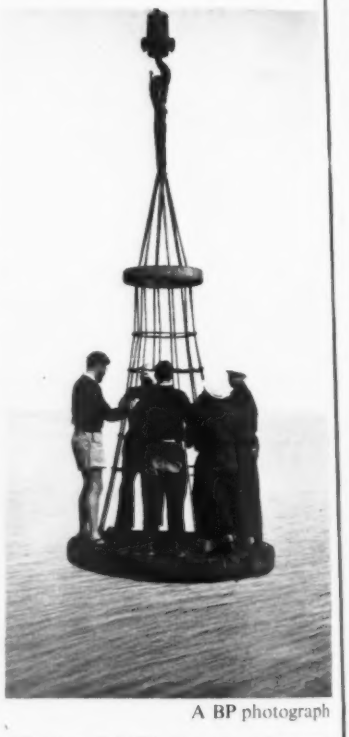
Adma Enterprise, however, is only half of the project. A land base was essential and the nearest land was Das Island which is only 1 mile long and ½ mile wide and mainly consists of sand a few feet above sea level, and rocky peaks reaching 100 ft. Construction of a base and harbour was awarded to a British company, whose advance party arrived on site in May 1956. At first all stores and provisions had to be brought 170 miles from Bahrain in dhows and delays arose from bad weather.

Work soon commenced on a temporary airstrip of watered and rolled sand which allowed two-engined Dove aircraft to fly in men and essential supplies from Bahrain. Later a tank-landing craft, *Adma One*, arrived from Britain and made more than 50 beach landings of cargo before a harbour was available.

Living quarters, comprising three camps—one for Europeans, one for senior Indian and Arab artisans, and one for Arab labour—were the first consideration and prefabricated bungalows were quickly erected. Also constructed was an industrial area with stores, workshops, power station, hospital, and helicopter hangar.

Harbour works formed a major part of the construction contract. Two breakwater arms, 1893 and 835 ft long, were built to enclose a harbour space 1200 ft long and 400 ft wide, with a loading wharf and dolphins.

Rock for the breakwater was obtained from a quarry on the island and two mechanical shovels, working day and night, dug over 500,000 tons of rock in 8 months.



A BP photograph

"Personnel Lift" for conveying persons from the launch to Adma Enterprise. *The space inside the cage is for luggage*

Just a year after their arrival the construction team handed the island over to ADMA, who immediately began to prepare to receive *Adma Enterprise*. On 23 November 1957, before the barge had been towed into the harbour, men were at work preparing to commission her.

To-day some 40 Europeans, including drillers, engineers, cooks, and stewards work in shifts for six days on the barge and then rest for 3 days on Das Island where swimming, football, and hockey are popular and tennis courts and a golf course are being constructed.

Personal Notes

Hector McNeil

Hector McNeil, B.E.,M.I.Mech.E., M.I.E.E., F.Inst.F., has been appointed managing director of Babcock & Wilcox Ltd, in succession to Sir Kenneth Hague, M.I.Mech.E., M.I.E.E., who has resigned from that post but remains deputy chairman of the Company.

Mr McNeil, who was born in New Zealand and graduated from Canterbury University College, Christchurch, joined the Company in 1931 as service engineer. In 1947 he was appointed general manager and he became a director in 1950 and deputy managing director in 1953.

J. Stewart Robertson, general manager, has been appointed a director to fill the vacancy created by the retirement of C. H. Sparks from the Board of Babcock & Wilcox Ltd.

Mr Robertson joined the Company in 1935, became assistant general manager in 1952, and was appointed general manager in 1953.

Kenneth Fidler, communications manager, Shell-Mex and B.P. Ltd, has been appointed marketing service manager in the Company's London Division.

Mr Fidler, who joined the sales staff of the Power Petroleum Co. in 1947, became assistant communications manager of Shell-Mex and B.P. Ltd in 1952. He succeeded the late Mr Ernest Fidler as manager in 1954.

G. E. D. King has been appointed communications manager to succeed Mr Kenneth Fidler.

National Benzole Co. Ltd have made the following appointments:

A. Moore, previously Northern divisional manager in Newcastle, has become group manager, Southern.

C. E. Wilson, formerly assistant divisional manager, Lancashire, has been appointed divisional manager, Northern and **B. Preston** is now assistant divisional manager, Lancashire.

G. F. S. Jackson has been appointed staff manager at the Company's head office in London.

Forrest F. Musgrave, D.Phil., F.R.I.C., F.Inst.Pet., has been appointed personal assistant to Sydney Barratt, chairman of the Albright & Wilson Group of companies. Dr Musgrave was formerly managing director of Lubrizol Great Britain Ltd.

Dr Musgrave has served with Imperial Oil Ltd, a Canadian subsidiary of Standard Oil, and the Lubrizol Corporation of Cleveland, Ohio, where he was first chemical research director and later technical assistant to the president. He was appointed managing director of Lubrizol Great Britain in 1949.

J. V. Delves, M.I.Mar.E., M.Inst.Pet., who has been managing director of Tidewater Oil Company (England) Ltd for nearly twenty-one years, retired at the end of February. He is succeeded by **George G. E. Money.**

Patrick Harper, formerly public relations officer of the East Midlands Gas Board, has joined the advertising department of the National Benzole Co. Ltd in London. He will edit their dealer newspaper *Mercury News* and help to run dealer Mercury clubs.

During the war Mr Harper served in the Royal Air Force, and subsequently graduated in statistics and economics from Nottingham University.

H. P. Lord, A.F.C., has been appointed general sales manager of Sigmund Pumps Ltd, Gateshead, from 1 March.

J. C. Stirton, the Arabian American Oil Company's vice-president in charge of engineering and construction, left his headquarters in Dhahran, Saudi Arabia, for retirement on 1 May.

A pioneer in the oil industry in Saudi Arabia, Mr Stirton has been associated with Aramco and, previously, with the Standard Oil Company of California for 38 years. More than any other individual, he has been responsible for building Aramco's plant in the area. Among major installations constructed wholly or partly under his supervision are Aramco's 189,000-b.d. refinery and eight-berth tanker terminal at Ras Tanura. He is a graduate in civil engineering of the University of Illinois and has been vice-president of Aramco since 1952.

L. M. Snyder, previously vice-president in charge of operations, has assumed the position of vice-president in charge of engineering, construction, and local sales. **W. R. Cooper** has become general manager for engineering and construction.

Harry W. Howze has been elected a vice-president and manager of aviation sales by Esso Export Corporation, international marketing affiliate of Standard Oil Company (New Jersey).

Mr Howze began his career with the Jersey organization in 1930 as an aviation salesman for Standard Oil Company of Louisiana, now the Esso Standard Oil Company.

In 1941, after holding marketing posts with several Jersey Standard affiliates, Mr Howze entered the Army Air Force in which he served until 1946, achieving the rank of colonel. Mr Howze was chief of the Aviation Petroleum Branch at Army Air Force headquarters and was cited by both the United States and Great Britain for his work in that post.

In 1946 Mr Howze returned to civilian life as sales manager of the Aviation Department of Esso Export Corporation and later held several posts in the marketing co-ordination department of Jersey Standard.

In 1954 he was named vice-president, director, and general manager of Esso Standard (Near East), Inc., with headquarters in Cairo, and in 1955 became president of that affiliate, a post he held until his current assignment.

David A. Rowland has taken up appointment as instructor in petroleum engineering at the Colorado School of Mines, Golden, Colorado.

Formerly a reservoir engineer with the Tidewater Oil Co., he is a Mines graduate, and possesses a master's degree in petroleum engineering from the University of California.

Around the Branches

BAHRAIN, ESSEX, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN, SOUTH WALES, STANLOW, TRINIDAD

London Branch

The first London Branch meeting to be held in the new Headquarters of the Institute took place on 26 February, when G. H. Thornley, following the Annual General Meeting, presented a paper on "Additives for Lubricants".

After outlining the historical development of additives, Mr Thornley explained how the increasing requirements of modern machinery had forced petroleum chemists to improve lubricants by "alloying" them with special chemicals.

Continuing, Mr Thornley described how the introduction of "heavy-duty additives", which imparted detergent dispersant properties, had greatly improved cleanliness in internal combustion engines working under adverse conditions, and had improved performance and at the same time reduced maintenance work.

Mr Thornley then described how load-bearing and anti-oxidant additives were also extensively used in transmission lubricants, turbine oils, transformer oils, and many other industrial lubricants, whilst additives specifically designed to improve certain physical characteristics such as viscosity index, pour point, etc., were now widely used.

The interest shown in Mr Thornley's very comprehensive paper was reflected in the number and range of questions which were raised from the floor. A vote of thanks was proposed by A. C. Mauchan, which was heartily endorsed by those present.

London Branch Officers for the forthcoming year are:— chairman, J. C. Jewell; vice-chairman, S. C. Price; secretary, J. H. M. Clark; treasurer, H. S. Kiernan; and chairman—Programme Sub-Committee, W. D. Davies.

Northern Branch

The Northern Branch, aware that many of their members reside on the "wrong" side of the Pennines and find it difficult, if not impossible, to attend a meeting in Manchester, determined to hold a meeting in Leeds.

26 February was the day chosen for the first meeting in Leeds, in the Hotel Metropole. J. G. Withers (British Petroleum Co. Ltd) was persuaded to deliver the inaugural lecture and arrangements were made to transport the Manchester committee and supporters to Leeds by coach. Unfortunately however, the Northern Branch underestimated that barrier which Nature has created between the two counties and on the appointed day all roads between Lancashire and Yorkshire were blocked by snowdrifts! Fortunately the rail link was opened up in time.

Mr Withers and his assistant, Mr Law, were also forced to enter Yorkshire by rail and to carry with them their 4 cwt of demonstration equipment as personal luggage!

However this all seemed worth while when it was known that some 60 people awaited the commencement of the lecture.

In opening the meeting, W. E. Huggett, chairman, welcomed the officials and members of the Yorkshire Oil & Grease Trades Association who had co-operated with the Branch in publicizing the lecture.

To illustrate his paper on "High Performance Lubricating Oils" Mr Withers used lantern slides, demonstrations by Mr Law, and many exhibits. Questions followed and their appreciation of the paper was shown with much enthusiasm by the audience.

After concluding the formal business of the meeting, the officials of the Northern Branch discussed the formation of a Leeds Branch and had the satisfaction of interesting several persons in this project.

Scottish Branch

A joint meeting of the Stirlingshire and District Sections of the Royal Institute of Chemistry and Society of the Chemical Industry and the Scottish Branch of the Institute of Petroleum was held in the Recreation Hall, BP Refinery (Grangemouth) Ltd, on 20 March.

Colonel F. M. Potter, O.B.E., chairman of the SCI Section, presided and introduced H. G. Davey, O.B.E., M.Sc., F.R.I.C., who spoke on "An Outline of Nuclear Technology, with some Indication on Typical Problems and Techniques".

Mr Davey stated that three materials were fissionable in a nuclear reactor: two were isotopes of uranium 235 and 233, and plutonium 239. Only uranium 235 was found in nature and occurred mixed with 140 times its own weight of uranium 238. Natural uranium was therefore the obvious choice for starting nuclear projects.

Many types of reactor were possible but the UKAEA had decided first to concentrate on natural uranium graphite-moderated gas-cooled reactors. GLEEP and BEPO were erected at Harwell and production reactors at Windscale. The latter were air-cooled and, since they were plutonium producers, their heat had not been utilized to generate electric power. Calder Hall reactors, a logical development from the Windscale type, had carbon-dioxide cooling in closed circuits and their heat raised steam which in turn produced electricity.

The graphite lattice containing the uranium was enclosed in a substantial biological shield to prevent emission of gamma radiation. Special techniques had been evolved for remote handling and remote operation of the reactors.

Fuel elements, when discharged from reactors, consisted of unchanged uranium, together with plutonium and fission products formed during reaction. These fission products comprised some 30 chemical elements, all of which were intensely gamma active.

Uranium and plutonium and fission products could be separated by chemical means. At Windscale a solvent-extraction process was used. The irradiated fuel rods were fed into a primary separation plant, which was protected by thick biological shielding and operated by remote control. After separation, plutonium processing continued in sealed units with Perspex windows which gave adequate protection against alpha particles but allowed visual execution of the operations.

From Windscale valuable lessons on operation and maintenance had been learnt. It had been believed that once a reactor had gone into action, access to it would be impossible. In fact, remote welding had been done successfully and entry had been gained to the Windscale chemical plants which allowed modifications to be introduced with a doubling of the throughput. Originally the Windscale chemical plants had been designed to handle the output of the two Windscale reactors; the same plants could now handle in addition the output of the four Calder Hall and four Chapelcross reactors.

Mr Davey illustrated his talk by a large number of lantern slides and, after a lengthy discussion, he was accorded a vote of thanks by Dr Magnus Pyke, chairman of the RIC Section.

South-Eastern Branch

On 4 March a joint meeting was held at the Medway College of Technology, at which the South-Eastern Branch of the Institute of Petroleum acted as hosts to the Kent Sub-Branch of the Royal Institute of Chemistry. The speaker was B. Jacob, of ICI Paints Ltd (Slough), and his subject was "Paints".

Mr Jacob explained that the constituents of a paint were a binder, a thinner, and a pigment and all three he described in detail.

As early as the second century A.D. linseed oil was in use, and to-day it still remained among the oils used as binders. A resin blended with an oil produced a varnish with hardness and drying properties. The natural resins, such as rosin and congo copal, formed varnishes not resistant to atmospheric conditions but the synthetic phenolic resins were particularly water-resistant. Synthetic resins could be divided into a number of groups, each with different characteristics; among these were the two-pack paints, such as etching primers, epoxy resins with high resistance to caustic solutions, and polyurethanes.

Thinners in use were white spirit, heavy naphtha, and cellulose solvents. It was emphasized, however, that wastage occurred from evaporation with all these thinners. Water-based emulsion paints had been produced; the earlier ones, formed from glue, casein, or the alkyd resins, were susceptible to porosity which caused a variation of gloss. Recently polyvinyl acetate emulsions had proved to be alkali-resistant, unsusceptible to porosity, and washable. In the United States styrene butadiene type emulsions had been developed as a result of products from synthetic rubber plants.

Powders of fine particle size were used as pigments and extenders were added to give body without affecting the colour. The oxides of lead, titanium, and iron were common pigments. Mr Jacob illustrated the use of red lead as a corrosion inhibitor for steel by a series of slides.

Methods of grinding the pigment, both between rollers and in a ball-mill, a cylindrical rotating drum half filled with balls, were shown. The development in methods of paint manufacture was illustrated, from spitting into the vat to the use of a thermometer as a means of estimating temperature.

Mr Jacob pointed out the multitude of kinds of paint that were available, from anti-fouling and chemical-resistant paints to quick-drying cellulose that had done so much to facilitate mass-production in the car industry.

After a number of questions, a vote of thanks to Mr Jacob was carried with acclamation. Representatives of both Institutes also expressed their thanks to the Kent Education Committee and the authorities of the Medway College of Technology for their co-operation and assistance.

Stanlow Branch Dinner-Dance

Last year the Stanlow Branch had to cancel its annual dinner because petrol rationing played havoc with transport arrangements, even for members of the oil industry! This year there were no such difficulties and on 7 March the Branch held its annual function just as usual. For the first time this took place in the new canteen of Lobitos Oilfields Ltd, Ellesmere Port. Representatives of nearly all the major petroleum and allied companies in the area attended.

After those present had warmed up with cocktails, C. N. Thompson, Branch chairman, welcomed the assembly of about 60 members and guests who settled down some half an hour later to enjoy a fine dinner prepared by the Lobitos catering personnel.

In three of the shortest speeches on record in the history of the Branch, Mr Thompson thanked J. S. Parker and the Lobitos management for their kindness and hospitality in providing facilities for the evening's enjoyment; he wished W. E. Frankenburg, of the Stanlow committee, success and long life in his impending retirement from Shell Refining Co. Ltd; and he expressed the thoughts of the whole gathering for H. G. Freeston's speedy recovery from his sudden and serious illness which had prevented him from attending.

After the dinner dancing continued until midnight to the music of the George Nicholls quintet, and a number of spot prizes were presented to the winning couples by Mrs Thompson.

Kuwait Committee

Recently elected chairman of the Kuwait Branch is R. J. L. Stephens, the deputy chairman being D. G. Hitt. Members of the Branch Committee are G. T. Becker, F. H. Colenutt, L. M. Craig, and G. Hetherington, the honorary secretary being G. A. Lee and the honorary treasurer J. Rae.

London Branch Hear About Water Speed Records

Donald Campbell, C.B.E.

"We are on the threshold of our endeavours to reach the target of 250 mph which was set for *Bluebird*, and hope in about six weeks' time, that is on 6 May, on Lake Coniston to achieve that ambition". It was with these words that Donald Campbell, C.B.E., concluded his lunch-time talk to the London Branch on 19 March. This was the first luncheon meeting held by the London Branch and the chairman, Ron Leach, introduced Mr Campbell by displaying a newspaper recording the attainment in 1957 by Mr Campbell of the existing water speed record of 239 mph.

Mr Campbell had during his talk outlined the developments which led to the present record, starting from the first record in 1902 of 13·5 mph. In 1939 Gorini, using a hydroplane, reached a speed of 90·8 mph and it was interesting to hear that the theory of the hydroplane had been developed by a clergyman. He had proved the mathematics of this method of water travel but when it was sent to the Lords of the Admiralty they could not see any use in the idea.

By 1930 the Americans had raised the record to 94 mph and in the same year it was lifted to 100 mph and in 1931 to 109 mph.

In 1932, said Mr Campbell, the record reached 124 mph and five years later his father, using a hydroplane powered by a Rolls Royce engine similar to that used for the Schneider air trophy, had increased this to 126·3 mph. In 1938 another mile was added to the record and in 1939 using a new form of hull a speed of 141·74 mph was attained.

After the war it was learned that Mr Kaiser, the builder of Liberty ships, was intending to endeavour to take the record back to America. The British team then decided to redesign the screw and to revert to the piston engine. Unfortunately an attempt in 1949 on Lake Coniston failed, due to mechanical trouble, when a speed of 150 mph had been reached. Meanwhile Sayers in the United States had brought the record up to 160 by using a new principle known as prop riding or semi-submerged propulsion. In this only two out of the three blades were submerged and the effectiveness of this was proved by hard practice and not by any laboratory or similar investigations. In 1952 Cobb, with a specially designed boat using De Havilland Ghost jet engines, attained the speed of 206 mph but unfortunately lost his life in this event. Investigation showed the cause of the accident to be due to pitching which was estimated to be at the rate of 8–9 seconds.

Wind tunnel tests and tests with models in the open were carried out on the Isle of Wight and it is reported that one steady old farm horse had the fright of his life when a small model hurtled over the hedge at an amazing speed. Full-scale trials carried out at Ullswater in July 1955 produced a speed of 203 mph and later in the United States after much trial and tribulation the speed of 206·25 mph was attained.

Returning to the United States Mr Campbell and his team made modifications to the boat and in September 1956 recorded a speed of 225·63 mph. Finally in 1957, on Lake Coniston, the present record was reached.

During the course of his talk Mr Campbell referred to the many problems and troubles which arose during these endeavours by himself, his colleagues, and his contemporaries, and stressed the advantages of tests being carried out on a small body of water and preferably on a private lake free from the interference of sightseers in water craft.

At the end of the meeting it was voted a 100 per cent success. The chairman voiced the hopes of those present that Mr Campbell would succeed in raising the record and achieving his ambition on 6 May.

Birmingham Students Dinner

As is customary, the 1958 Annual Dinner on 4 March, eleventh in the series, of the Birmingham University Chemical Engineering Society, which incorporates the Students Section of the Institute, was a thoroughly enjoyable and much enjoyed occasion. The chair was taken by Professor F. H. Garner, O.B.E., who is director of the Department of Chemical Engineering, and he was supported by D. H. Jones, chairman of the Society. Guest of honour was Dr F. Mayo, manager of Esso Fawley refinery, and among those present were representatives from the petroleum and chemical engineering industries.

Toast of the evening was "Our Graduates". Proposing this, Professor Garner said that this toast was a more intimate one than those of previous years. It was more intimate because it concerned more particularly a large proportion of those in his audience—the graduates and the graduands. Referring to the steps in graduation, he said it was fascinating to watch the development of the student during those three or four years.

The United States, said Professor Garner, was much better than Britain in maintaining contact between the universities and their graduates. The graduates often made arrangements to meet every ten or so years and this provided a close link. He had been considering whether a similar procedure could be adopted here and was preparing lists of past graduates. He thought that it might be feasible to divide the lists into two groups—pre-war and post-war—marking the change in emphasis of the School. Their guest speaker that evening would fit into both periods, as Dr Mayo had taken his first degree before the war and his Ph.D. in the post-war period.

Dr F. Mayo, responding to the toast, paid a tribute to Professor Garner who, he said, except for his accomplishments had changed not one bit from the time when he (Dr Mayo) had been a student there. Under Professor Garner's guidance, the Department had grown from a comparatively small Department of Oil Engineering and Refining to its present size, embracing the much wider field of chemical engineering. That was a major achievement of which the University, its graduates, and Birmingham were rightly proud.

Referring to the subject of the toast—the graduates—

At the Birmingham Students Dinner the toast "Our Graduates" was proposed by Professor F. H. Garner (left) *and replied to by Dr F. Mayo. R. O. Pelham proposed the toast "The Guests" and J. H. Grew, after responding, proposed "The Society". D. H. Jones* (right), *chairman of the Society, responded*

Dr Mayo said that if his own Company was a fair example the Birmingham University Chemical Engineers did not seem to be doing too badly. Esso had Birmingham graduates on its board, in its refinery, and in a fair share of top positions. He reminded them, however, that the oil industry was a highly competitive one and one which had a high regard for the abilities of its staff. It allowed no discrimination as to a man's background, promotion being solely on capabilities.

In conclusion, Dr Mayo said he hoped that the suggestion of closer contact between the University and its graduates would materialize. It would lead to a helpful exchange of information and be of benefit to both University and the industry.

The toast "The Guests" was proposed by R. O. Pelham, the Society's treasurer, and replied to by J. H. Grew, who also proposed the toast "The Society". He stressed the importance of the Society in the work of the Department and expressed their pleasure in its continuing strength.

Chairman of the Society, D. H. Jones, thanked the gathering for their reception of the toast. In an apt and excellent speech he recounted the events of the year in the various fields of activity.

LABOUR STATISTICS FOR THE U.K. PETROLEUM REFINING INDUSTRY

The following figures are taken from the March 1958 issue of the *Ministry of Labour Gazette* (cf. previous figures given in the IP REVIEW, 1957, **11**, 306)

Figures in italics are the averages for all the industries covered by the tables

	Men (21 *and over*)	*Youths and boys*	*Women* (18 *and over*)	*Girls*	*All workers*
No. of workers covered by remuneration statistics ...	18,887	803	1197	25	20,912
Average earnings in last pay-week in October 1957 (shillings)	263/9 *251/7*	114/6 *108/4*	136/11 *129/6*	— *85/2*	250/6 *212/5*
Average number of hours worked in this pay-week ...	48·4 *48·2*	43·8 *44·5*	42·2 *41·2*	— *42·1*	47·9 *46·4*
Average hourly earning in this pay-week (pence) ...	65·4 *62·6*	31·4 *29·2*	38·9 *37·7*	— *24·3*	62·8 *54·9*
			Males	*Females*	
Numbers employed (January 1958)			34,400	7500	41,900
Numbers unemployed (at 17 February 1958)			254	35	289

Exhibitions and Conferences

Symposium on the Organization of Chemical Engineering Projects

The Institution of Chemical Engineers and the Institute of Petroleum have arranged a Joint Symposium on the Organization of Chemical Engineering Projects, which will be held at Olympia, London, on 24, 25, and 26 June, during the Chemical and Petroleum Engineering Exhibition.

For the purpose of the Symposium the subject has been divided into seven sections: Design data and specification of requirements; system of project organization; functions of the contractor; programming and progressing systems and meeting completion dates; cost estimating and control; plant commissioning; and the analysis and future use of project records.

In general, two papers, by different authors, will be given in each of these sections. The views will be expressed by industrial chemical manufacturing firms and industrial contracting firms. Manufacturing firms include British Petroleum Co. Ltd, Imperial Chemical Industries Ltd, and Shell Chemical Co. Ltd. Contracting firms include E. B. Badger & Sons Ltd, Power-Gas Corporation Ltd, and Simon Carves Ltd.

The Symposium will be introduced in the afternoon of 24 June by a general survey of the problem, given by the managing director of the Industrial Group of the United Kingdom Atomic Energy Authority.

Preprints of all the papers are available to registered members of the Symposium. The registration fee for the symposium is £2 for members of the Institution of Chemical Engineers, the Institute of Petroleum, and members of Constituent Bodies of the European Federation of Chemical Engineering. The fee for non-members of these societies is £3.

Enquiries should be addressed to the general secretary, The Institution of Chemical Engineers, 16 Belgrave Square, London, S.W. 1.

Accurate Viscosity Measurement

The accurate measurement of the viscosity of liquids is the subject of a joint meeting of the British Society of Rheology and the Institute of Petroleum to be held at 61 New Cavendish Street, London, W.1, on Friday, 6 June. Seven papers will be presented, as follows:

"The Determination of Viscosity by the Oscillating Vessel Method", by R. Roscoe.

"The Precise Measurement of Kinematic Viscosity in the Petroleum Industry", by K. S. Lammiman and P. R. Morris.

"Viscosity Measurements at High Rates of Shear", by R. Schnurmann.

"A short report on the Standard Methods of Measuring the Viscosity of Liquids in C.G.S. Units", by W. Jennings and E. W. J. Mardles.

"Measurement of the Viscosity of Polymers at Extremely Low Concentrations", by P. P. Rutherford.

"Viscometers and Methods of Use", by L. A. Steiner.

"Some Viscometers and Equipment used in the Control of Drying Oil Polymerization", by C. H. Hutchinson.

On the following day arrangements have been made for a visit to the viscometry, thermometry, and chronometry sections of the National Physical Laboratory, Teddington.

Full details of the meeting and the visit will be available in mid-May. Those wishing to participate in the meeting or the visit should communicate with N. Wookey, British Society of Rheology, 52 Tavistock Road, Edgware, Middlesex.

Management Study Groups

A new series of study groups in management has been announced by Osmond Turner Mead Associates, of 3 Gower Street, London, W.C.1, who specialize in the field of management training.

In order to ensure individual tuition each study group, which lasts for 4 weeks, consists of not more than twelve people. Great stress is laid on the importance of clarity and accuracy in thinking, speaking, and writing, and this is reiterated throughout the course. Six main aspects of management are studied, including its functions, principles, and organization. The groups are headed by Captain T. Wheeldon, R.N. (ret) who was, until recently, management training officer, royal dockyards.

Other shorter courses are also offered. Every month a 5-day course is held on Management and Communications. This is designed for the established and experienced manager who is given an understanding of the problem and is then taught the techniques of good communications before putting them into practice. Each member is assigned a special project about a fortnight before the course starts, and during the course he writes and speaks about this project. Among recent subjects set were Automation, Managers for To-morrow, and Delegation of Authority. A 5-day course on Preparing for Management is provided for the younger manager, the trainee, and the supervisor earmarked for promotion. It covers the same ground as the management and communications course but the exercises require less knowledge and experience.

Letter and Report Writing for Managers forms the subject of a 3-day course for managers and senior supervisors who are in charge of departments where there is much correspondence. Before commencing the course candidates are required to write a paper which is analysed in detail during the course. A follow-up plan is supplied to each member on completion of the course to consolidate what had been learnt.

Technical Reports are dealt with in another 3-day course and members have to write a paper on a specified subject outside their own fields. This course is also a small group, composed ideally of eight people and never more than twelve.

Finally there is a 2-day course on Effective Speaking for senior managers. New courses are held each month throughout the year and practice speeches are selected to meet the future needs of candidates.

All the short courses can be run on a firm's own premises, if so desired.

Details can be obtained from the director of management studies, Osmond Turner Mead Associates, 3 Gower Street, London, W.C.1.

Mechanical Handling Exhibition

What promises to be the largest single exhibition of mechanical handling equipment opens at Earls Court, London, on 7 May and continues until 17 May. The exhibits will occupy about half-a-million square feet and the fifteen general sections will cover all types of equipment from the smallest fork-lift truck to complete factory installations. The number of firms taking part is over 250 and some of the plant on view has come from overseas.

Coincident with the exhibition there is a Mechanical Handling Convention, which opens on 8 May with a paper on handling problems in the motor industry. Other industries and problems dealt with in subsequent papers will be brewing, power stations, storage and distribution, and docks. A paper by W. B. Beard, a member of the TUC General Council, on 15 May will discuss the effect of automation and mechanization on labour relations. All sessions start at 11 a.m. and tickets, which also admit to the exhibition, are free on application from H. A. Collman, *Mechanical Handling*, Dorset House, Stamford Street, London, S.E.1.

Symposium on Instrumentation and Computation in Process Development and Plant Design

From 11 to 13 May, 1959, a Joint Symposium on Instrumentation and Computation in Process Development and Plant Design will be held at the Central Hall, London, S.W. 1.

The symposium is organized by the Institution of Chemical Engineers, the Society of Instrument Technology, and the British Computer Society, under the aegis of the British Conference on Automation and Computation.

Any author wishing to submit a paper, is invited to contact the general secretary, The Institution of Chemical Engineers, 16 Belgrave Square, London, S.W. 1, before 1 June 1958.

Books and Films

Petroleum Testing Methods

The recently-published seventeenth edition of the Institute's *Standard Methods for Testing Petroleum and Its Products* contains full details of five new methods for testing various properties of petrolem products. They are:

Bitumen Content (*IP* 162).—A composite method for examination of bituminous mixtures, incorporating IP 106, IP 140, and methods B and C of IP 47.

Sulphated Residue from Petroleum Products (*IP* 163).—A revision of method B of IP 4 for determining sulphated residue of oils containing metallo-organic additives.

Adhesion and Stickiness (*IP* 164) and *Drying Characteristics* (*IP* 165) of hard film temporary protectives—Methods for assessing these properties of solvent-deposited temporary protectives.

Scuffing Test of Gear Oil (*IP* 166).—This method uses the IAE gear test rig to evaluate anti-scuffing qualities.

Of the other methods, twenty-seven have been revised technically and three have been withdrawn. The latter are IP 106 and IP 140, now revised and incorporated in IP 162, and IP 38 (*Existent Gum, Motor Fuel*), which is covered by IP 131.

In total this book contains information on 126 standard test methods and details of the apparatus and chemicals required. A table of conversions of kinematic viscosity to Redwood No. 1 seconds appears in an appendix. Other appendices cover the heats of combustion of petroleum gases, the evaluation of crude petroleum, interpretation and use of precision data, and a table of temperature conversions.

Copies of this 788-page book are obtainable from the Institute, price £2 (35*s. to IP Members*) post free.

British Standards Yearbook 1958

The 1958 edition of the British Standards Yearbook contains information about the Institution and the services it offers.

It lists the British Standards current at 1 January 1958 and gives a brief description of each. More than 3100 standards appear in this edition.

A very comprehensive index completes the book which can be obtained at the price of 15*s.* from British Standards Institution, 2 Park Street, London, W.1.

Serving the World

The Chancellor of the Exchequer has contributed a foreword to a new short survey of the achievements of British inventors and scientists in the field of the practical applications of electricity. The survey, which is called *Serving the World*, has been published by the British Electrical and Allied Manufacturers' Association as a souvenir of the 1958 Brussels International Exhibition.

The book covers the generation of electricity by solid fuel, water power, and nuclear energy, and an interesting map is reproduced of the location of existing and projected nuclear power establishments in Britain and Northern Ireland.

Other sections deal with transmission lines, electricity for transport, telecommunications, electronics, and radio and television.

The book was distributed free to interested visitors to the Brussels exhibition, but a limited number of copies are available from British and Allied Industry Section, 36 Kingsway, London, W.C.2, at the price of 6*s.* post free.

Coryton Refinery

A portrait in miniature of plant and activities at Coryton refinery is given in a revised edition of a small booklet issued by the Mobil Oil Co.

Photographs in black and white and full colour are supplemented by a plan of the refinery and a process diagram.

Copies of the book can be obtained from Mobil Oil Co. Ltd, Caxton House, Tothill Street, London, S.W.1.

Weighing Laboratory Techniques

A recent pamphlet published by Deutsche Gesellschaft für Chemisches Apparatewesen, Frankfurt, deals with laboratory techniques in weighing.

It reviews all types of balances used in laboratories and gives definitions of terminology and symbols employed.

Further information is obtainable from DECHEMA, Rheingau-Allee 25, Frankfurt (Main), Germany.

Bechtel in Arab Lands

Half a century of constructional work for the oil industry in the Middle East forms the theme of a handsome 150-page book issued by the Bechtel Corporation of San Francisco, and compiled by Richard Finnie.

Something of the mystery and desolation of these ancient lands is conjured up by the Arabic script that titles the front and back covers, and by the end-papers of camels trekking across a featureless desert—featureless indeed, except where two Hortonspheres stand like shining fungoid growths as symbols of present-day enterprise.

Splendid aerial views depict the vastness and solitude of this region in which modern refineries and loading quays have been built. A hint of the difficulties faced by constructional teams is given by the statement that for them nearly every mouthful of food, nearly every tool and piece of equipment had to be brought from sources thousands of miles away.

Each of the nine chapters on Bechtel's operations in specific areas is headed by a small sketch map, but a full-page relief map confronts the first article on Oil and the Arabs. The turning point in the economic history of the Middle East came in 1908 with the discovery of oil at Masjid-i-Sulaiman in Iran, but nearly twenty-five years elapsed before the oil of the Arabian Peninsula began to come to light.

Separate sections deal with Bahrain, Kuwait, Kirkuk to Banias, Aramco, Tapline, Aden and Mediterranean refineries, and the Saudi Arab Government.

The photographs, which comprise the major part of the book, are outstanding in quality and variety. Aerial views of refineries and loading quays contrast with close-up portraits of Arab rulers; an airstrip on a vast barren plain is typical of Middle East terrain, but the group of students studying in a modern technical college could easily be found in many a city of Western Europe.

A particularly impressive aerial photograph shows two lorries blazing a trail across the desert, and leaving long wakes of billowing sand behind them, with never a tree or human habitation in sight.

The final article pays tribute to the men who worked to make these projects a reality. From their labours have come benefits to the Arab peoples in wealth and employment. It is interesting to note that in 15 years it is estimated that there will be only one American or European to 50 nationals employed on any Middle East constructional job.

Castrol Achivements 1957

"Around the world" is the theme of the latest edition of *Castrol Achievements* which, in 48 pages, presents a selection of motor-sport successes gained in 1957 by competitors who used Castrol lubricants.

The book has three sections. The first, dealing with Europe, mentions such personalities as Tony Brooks, Ian Walker, sports car champion, R. Hopfen, the European touring champion, and Nancy Mitchell, the ladies rally champion.

The Commonwealth section includes winners in Canada, South Africa, Singapore, and "down under". In the American section are many of the best drivers in the States. Also shown are the B.M.C. and M.G. record breakers at Utah and Fangio's end-of-season triumph in Brazil.

Many photographs of famous motor cyclists are reproduced, including the world 500-c.c. champion, Liberati.

Achievements 1957 is obtainable from C. C. Wakefield & Co. Ltd, 46 Grosvenor Street, London, W.1.

Tar Products Testing Methods

Since the publication of the third edition of *Standard Methods for Testing Tar and Its Products* in 1950 a very considerable amount of revision work has been undertaken. The result is that the fourth edition, which has just appeared, contains details of a number of new methods for the examination of tar and tar products. These new methods are:

REFINED TAR, direct determination of equi-viscous temperature (EVT). (TM 10–57).

CRUDE BENZOLE, determination of elementary sulphur (TM 11–57).

CRESYLIC ACIDS, determination of metacresol in. (TM 9–57).

NAPHTHALENE:
Non-volatile matter (CN 6–57).
Crystallizing-point (CN 7–57).
Sulphur (RN 3–57).

CREOSOTE OIL:
Sulphur (Grote combustion) (CO 14–57).
Chlorine (CO 15–57).
Saturated hydrocarbons (TM 2–57).

ANTHRACENE:
Anthracene in heavy oil and crude anthracene (TM 4–57).
Phenanthracene in heavy oil and crude anthracene (TM 5–57).
Carbazole in heavy oil and crude anthracene (TM 6–57).

PITCH, volatile matter—muffle furnace method (PT 6–57).

Many other test methods have been modified and a number have been withdrawn.

Price of the book (585 pages) is £2 2*s* 0*d* (postage 1*s* 9*d* extra) and copies are obtainable from Standardization of Tar Products Tests Committee, Oxford Road, Gomersal, Nr. Leeds.

Industry Fights Corrosion

The complete proceedings of the Corrosion Convention, held in London last October, have been published under the title *Industry Fights Corrosion*.

The thirteen papers and the discussion that followed each are reproduced in this book. Two of the papers are of special interest to the oil industry and brief mention of them follows.

Dr H. B. Footner, who is charge of the Shell Petroleum Co. Ltd's paint and corrosion section, gave a paper on "Protection of Plant and Equipment in the Petroleum and Chemical Industries". He deals with the five different factors that cause corrosion and continues with some of the preventive treatments available. Starting with a consideration of external painting of steel structures, he lists current practice, principles, and new developments. He also deals with the interior treatment of tanks, the internal and external protection of pipelines, and the lining of drums.

"Corrosion and Water Treatment" is the title of the paper by G. G. Sindery, who was for six years an installation engineer on the overseas staff of the Shell Petroleum Co. Ltd.

Mr Sindery concludes that certain water treatment methods actually increase the corrosiveness of the water. However, corrosion can be greatly reduced by correct selection of the pretreatment method and can be eliminated by choice of a conditioning treatment suited to service conditions.

Other papers cover corrosion in the shipping and atomic energy industries, cathodic protection, corrosion-resistant metals, and hot-dip galvanizing.

Industry Fights Corrosion is available from *Corrosion Technology*, Eden Street, London, N.W.1, price 21*s*. post free.

Revised British Standards

Details are given below of some recently published revised British Standards and copies can be obtained from BSI, Sales Branch, 2 Park Street, London, W.1, at the prices given.

BS 802, *Tarmacadam with Crushed Rock or Slag Aggregates*, incorporates revised tables of base-course and single-course materials, which take into account the need to vary the tar content according to the nature of the aggregates. A similar differentiation has been made for medium-textured wearing-course materials.

Some amendments have been made as a result of the revision of BS 76, *Tars for Road Purposes*. In common with all recent British Standards for bituminous road materials, the compositions specified for tarmacadam are those to be found from the analysis of freshly mixed materials.

Section 4, "Recommendations for the Laying of Tarmacadam", has been brought up to date and co-ordinated with the laying clause of other similar British Standards. The price of BS 802 is 6*s*.

BS 1097, *Mastic Asphalt for Tanking and Damp-proof Courses* (*Limestone Aggregate*), now specifies three types of asphaltic cement and the separate treatment of limestone and grit has been superseded by combining in an "aggregate" clause requirements for these two constituents of the mastic asphalt. BS 1097 is priced at 4*s*. 6*d*.

BS 1259, *Intrinsically Safe Electrical Apparatus and Circuits*, introduces a list of flammable gases and vapours for which apparatus may be accepted for test and possible subsequent certification. These gases and vapours are placed in four groups (methane, pentane, ethylene, and hydrogen) for test purposes.

General requirements are laid down for all types of electrical equipment regarded as safe for use in explosive atmospheres and the term "intrinsically safe" is defined. BS 1259 costs 4*s*.

First published in 1935 and revised soon after the war, BS 649, *Diesel Engines for General Purposes*, has now been issued as a new edition of narrower scope than its predecessors and concentrates on stationary engines.

The previous 12-hour basis of rating has been replaced by a continuous rating, and de-rating formulae for altitude and temperature have been extended to pressure-charged engines. Two classes of governing are now specified and test requirements have been amplified.

Guidance is given on engines for diesel-driven electric generators. Limits are specified for cyclic irregularity and, in the case of alternator sets, in parallel with others, for angular deviation. BS 649 is priced at 5*s*.

BS 2953, *Diesel Engines for Rail Traction*, contains details of the engine tests required for recognition under this Standard. Information is also provided on ancillary equipment, such as pumps and pipework, and on traction rating and conditions.

The provisions of this Standard have taken into account practice overseas and engines conforming with the Standard should meet regulations of many overseas markets. BS 2953 costs 6*s*.

BS 2951, *Glossary of Terms Used in High Vacuum Technology*, defines terms of accepted value in many branches of industry where high vacuum technology has become important.

The glossary is arranged in sections, dealing with general terms, vacuum systems, pumps and pump components, manometers and gauges, leak detectors, and vacuum applications.

Comprehensive notes on pressure units, critical backing pressure, and sensitivity definitions are given in an appendix. The price of this Standard is 7*s*. 6*d*.

Transonic Flight

The second in a series of three films on high-speed flight, produced by the Shell Film Unit, has recently been released. The first, *Approaching the Speed of Sound*, was mentioned in IP REVIEW for August 1957, and the new colour film, *Transonic Flight*, extends the story to the problems encountered by aircraft in the speed range up to approximately Mach 1·3, 1·3 times the speed of sound. In the transonic range the flow of air round an aeroplane is partly subsonic and partly supersonic and this may cause unstable conditions because of shock waves.

Various methods of lessening the effects of shock stall and making flight in the lower part of the transonic range smoother and less hazardous have been devised. Prominent amongst these are thin swept-back wings which are also used in the subsonic speed range.

To demonstrate the flow of air and changes in density below and above Mach 1, the colour schlieren method of photography is used in the film. This is based on the principle that rays of light are bent from their path if they pass through air, the density of which is changing in a direction at right angles to the light rays. These deflexions can be photographed in colour and the schlieren effects have been specially treated during processing so that supersonic regions appear in a lighter green than the normal background colour. The film explains, in passing, two ways in which sonic "bangs" can be produced.

Transonic Flight extends the older series of six films on *How an Aeroplane Flies* which were concerned solely with flight at speeds at which air acts as if it were incompressible. The new film has been produced for use by pilots transferring to jet-powered airliners, by air cadets, and by members of air forces generally. It supplies background information for airline staffs and should be of interest to all air-minded people.

The film is distributed through the usual Shell distributing agencies, to whom applications for loan should be addressed.

Notes on Work Study

In July 1955 the Association of British Chemical Manufacturers, in order to assist firms contemplating adoption of work study, published the first two of a series of Notes on Work Study. The first was entitled *How to Start* and the second *Some Results*.

To-day about 80 per cent of the employees in the chemical industry work for firms where work study is applied. However, many smaller firms do not yet use work study, perhaps because they consider it is effective only with large organizations. The ABCM has therefore issued a third booklet, *Case Histories from Smaller Firms and Individual Plants in the Chemical Industry*.

The book describes 21 case histories of applications in a wide variety of operations and remarkable financial savings have been attained. These range from £200 to about £10,000 per year, which it is hoped will encourage smaller firms to reconsider the advantages of work study.

Copies of the book, price 4*s*. post free, can be obtained from ABCM, Cecil Chambers, 86 Strand, London, W.C.2.

World Petroleum Statistics

A 40-page section on petroleum and allied products in the latest edition of *Statistical Summary of the Mineral Industry* lists world output, imports, and exports for the five-year period, 1951–56.

Statistics are also given of production of natural gasoline, natural gas, oil-shale, and refinery products.

A comparison of coal and oil production is facilitated since figures for both are given in long tons.

In addition to petroleum and coal, sixty-four other mineral groups are dealt with, including uranium, diamonds, and strontium.

Prepared by Mineral Resources Division, Overseas Geological Surveys, the *Summary* is published by Her Majesty's Stationery Office, at the price of £1 7*s*. 6*d*.

The Dangers of Flammable Liquids

Flammable liquids are in constant use and accidents involving them frequently occur. Such accidents often are caused by casual handling of small quantities of liquid, and although they may not lead to large fires they may prove fatal or produce serious injury.

The most common mistakes in handling flammable liquids are dealt with in a new fire-protection bulletin, *Flammable Liquids are Dangerous*, issued by the Fire Protection Association.

Examples of accidents are given and safety recommendations, the provision of non-inflammable substitutes, and installation of fire-fighting equipment are included.

Free copies of the bulletin can be obtained from the Fire Protection Association, 15 Queen Street, London, E.C.4.

Trade Literature, etc.

Natural Gas Pipeline in Pakistan

The River Indus has caused a change of plan in the completion of the 16-inch 200-mile natural gas pipeline being laid between Sui and Multan in West Pakistan.

Welding Supervision Ltd, who were responsible for the entire welding supervision and radiographic control of the welding, are now controlling and supervising an 80-mile detour to avoid crossing the river. This alternative consists of a 10-in dia. pipe which forms a link between the original Sui-Karachi line and the Multan line on the south-east bank of the Indus.

Gas will therefore flow from Sui through the Sui-Karachi line to Sukkur where the link will take it to the Sui-Multan line and thence to Multan.

Constructors John Brown Ltd at Dounreay

One of the main contractors for the Dounreay fast breeder reactor is the Instrumentation Division of Constructors John Brown Ltd.

Among the work CJB have carried out at this site is the engineering and construction of the panels for the reactor central control. Built to the requirements of the Instruments Design Office of the Industrial Group of the UKAEA, the panels comprise an 80-ft-long graphic instrument panel, a control desk, and electronic equipment racks.

CJB also supplied the sphere instrument cubicle, the sphere instrument panel, and numerous ancillary panels.

Complete calibration and pretesting of all instruments and associated electronic systems, and installation of all instruments and electronics were also carried out by the firm.

Valve Lapping and Grinding Machine

A special machine for lapping, grinding-in, and reconditioning large cocks and valves has been produced by Rockwell Tool Co. Ltd, Edgware Road, London, N.W.2 for the Esso Petroleum Co. Ltd.

It has several novel features. The lapping compound is delivered by a special pump; the taper plug is automatically lowered into the working position; and an automatic timing device is provided to control the grinding-in.

It is claimed that much time is saved by this machine in comparison with conventional methods of lapping large cocks.

Portable Industrial X-ray Sets

Designed for intermittent or continuous radiography on site, in the factory, or in the laboratory is the Fedrex portable 200kV 5 mA industrial X-ray unit.

The equipment is fully described in a new leaflet issued by Inspection Equipment, 19 Broad Court, Drury Lane, London, W.C.2, from whom also exposure charts showing the unit's performance with steels can be obtained.

Servicing of the equipment can be carried out throughout Britain either on site or the Company's laboratory in Kent.

Work Begins on BP Canadian Refinery

The Lummus Company of Canada Ltd has been appointed overall contractors for construction of the BP Group's refinery in Canada, at Ville d'Anjou, Montreal, which is due to be completed and in operation by the middle of 1960.

A new BP company is being formed to own and operate the refinery. It will be incorporated in Canada and will have its headquarters in Montreal.

The refinery will have an input capacity of 25,000 b.d. and the main processing plant will include a crude-oil distillation unit, a catalytic reformer, a catalytic cracker with an associated polymerization unit, and a hydro-desulphurizer.

Most of the equipment will be purchased from Canadian and British sources and the Lummus Company will employ local contractors for the work on site.

Griffin & George (Laboratory Construction) Ltd

An excellent recovery to full production has been made by Griffin & George (Laboratory Construction) Ltd after the loss by fire of their Birmingham joinery works during the night of 25 February.

The Company is now operating from Walsall Road, Perry Barr, Birmingham, 22B, in premises which permit future expansion of production to meet increasing demands for their laboratory furniture.

The group's output of scientific apparatus was unaffected by the fire, for all instrument production is carried out in other factories in Birmingham and Mitcham, Surrey.

Valve and Boiler Feedwater Controls

Described and illustrated in recently issued leaflets are a range of pneumatic power operators for the remote or automatic operation of large valves and dampers, and a two- or three-element feedwater control for water-tube boilers.

Copies of these publications are obtainable from James Gordon & Co. Ltd, Dalston Gardens, Stanmore, Middlesex.

Air-conditioned Coaches for Venezuelan Oilfields

Two specially air-conditioned coaches have recently been shipped from Britain to Venezuela for use in the oilfields operated by Compania Shell de Venezuela Ltd.

The vehicles, which cost over £6000 each, are Commer Avenger coaches with bodywork by Mulliners Ltd, and Stone-Carrier air-conditioning plant by J. Stone & Co. (Dartford) Ltd.

Each coach seats 30 passengers on individual reclining seats and the discomfort of travelling in temperatures of well over 100° F. has been alleviated since the air-conditioning plant provides twelve complete changes of cool dry air per hour.

Slight positive pressure within the vehicle prevents entry of dust and fumes and the insulation substantially reduces running and traffic noise.

An internal public-address system is fitted and this also has an external loud speaker mounted on the front dome panel.

Shell-Mex and B.P. to Fuel Motorway Building Plant

Shell-Mex and B.P. Ltd, in conjunction with John Laing & Son, have planned a "Commando Operation" to supply petroleum products to the vast array of mechanical earth-moving and constructional equipment engaged on building 53 miles of the London-Birmingham motorway.

Shell-Mex and B.P. Ltd are responsible for fuelling arrangements on three of the four sectors of road and special four-wheel drive tankers have been acquired to negotiate the heavy ground. These have pumping and metering equipment and can dispense gas oil, derv, or motor spirit as required. Conversion work was carried out at the Company's maintenance and repair centre at Fulham.

Solartron and Ericsson Join Forces

The Solartron Electronic Group Ltd and Ericsson Telephones Ltd have entered into an arrangement whereby Solartron will sell certain Ericsson products. The arrangement is world-wide except for Scandinavia and South Africa. When this was announced the commercial director of Solartron said that, with the European Free Trade Area in mind, subsidiaries had been set up in Italy and Germany and were being formed in Sweden, Holland, and France.

A new Solartron product exhibited when the above announcement was made was the "Digicator", an electronic device which eliminates pointers and dials to give an instrument reading direct in neon-lit figures.

New Chloride-free Paraffin Remover

Under the trade name of Solvo, the Tretolite Company Division of Petrolite Corporation of St Louis and Los Angeles has introduced paraffin removers that are free of organic chlorides.

These removers are dispersible in both oil and water and can be used with both, and as correctives or preventives.

Full details are given in an illustrated brochure available from the Tretolite Company, 369 Marshall Avenue, St Louis 19, Missouri, U.S.A.

New Protective Coating

A new protective coating for metal and concrete surfaces has been developed in Britain by Wailes Dove Bitumastic Ltd, Hebburn, Co. Durham.

It is said to combine the waterproofing properties of coal-tar pitch with the resistance to chemical attack and corrosion of epoxy resins.

It has excellent adhesion to both metal and concrete and can withstand exposure to acids, alkalis, oils, fats, and many other corrosive chemicals.

Ultra-fine Filtration of Industrial Oils

The Schlegel F1 and F2 filters, recently introduced to the British market, are designed for continuous ultra-fine filtration of industrial oils and petroleum products to a fineness down to 2 microns. They are small and compact in relation to their capacity and simple and safe to operate.

The filter elements are easy to remove and can be cleaned.

Schlegel filters are handled in Britain by Liquid Systems Ltd, Wellesley Road, Croydon.

Metropolitan-Vickers Electrical Equipment for Iran

Metropolitan-Vickers Electrical Co. Ltd has been awarded a contract valued at approximately £1½ million for the construction and equipping of the Gach Saran power system for the Iranian Oil Exploration and Producing Company.

The scheme will comprise a 12-MW power station with three Metropolitan-Vickers gas-turbine generators that will burn natural gas from the oilfield, together with switchgear, transformers, and transmission lines.

Gach Saran is about 2500 ft above sea level in southern Iran and oil will be piped to a new sea terminal at Kharg Island in the Persian Gulf.

Sub-contractors for the civil engineering work are Richard Costain Ltd, and for the transmission lines and cable work British Insulated Callender's Construction Co. Ltd. Consulting engineers are Ewbank and Partners Ltd. The complete system is to be commissioned in May 1960.

New Range of Gas Indicators

The RJ gas indicator range is now available in Britain. These instruments compare a gas mixture under test in one chamber with a reference gas (usually air) in the other chamber by interferometric method. The RJ Type 17 methane indicator has received Ministry of Power approval. Readings take only a few seconds and no special skill or training is required. Detailed literature and information is obtainable from Joberg Ltd, 33 Barbican, London E.C.1.

Self-priming Diaphragm Pump

Leaflet 301, issued by the Kestner Evaporator & Engineering Co. Ltd, 5 Grosvenor Gardens, London, S.W.1, describes the Keebush diaphragm pump which is glandless, self-priming, and suitable for acids and acid slurries.

The pump has a body of Keebush synthetic resin, and the diaphragm and ball valves are of synthetic rubber and flexible plastics.

United Kingdom Agents for Two American Firms

Soundrite Ltd, electro-acoustic engineers and consultants, 82–83 New Bond Street, London, W.1, have been appointed sole United Kingdom distributors and agents for two American engineering corporations.

The first is Altec Lansing who produce microphones and general equipment for professional audio work and have also developed a medical microphone which gives reliable reproduction of the heart sounds.

The second corporation is Stancil Hoffman, who specialize in recording equipment for the film industry.

Expansion Plans for Concon Refinery

Capacity of Empresa Nacional Del Petroleo's (ENAP) Concon, Chile, refinery, will be expanded by 24,000 b.d. through the addition of new units—a 24,000-b.d. atmospheric and vacuum distillation unit, a 12,000-b.d. Orthoflow fluid cat cracker and gas recovery unit, and a 6000-b.d. cat desulphurization and reforming unit and a 1100-b.d. alkylation unit. The boiler plant facilities will also be expanded. Process, mechanical, and design engineering and procurement will be by The M. W. Kellogg Company, New York.

The atmospheric and vacuum distillation unit will be capable of processing either Magallanes or Medium Officina crude oils. The Orthoflow cat cracker and gas recovery unit will operate at 60 per cent conversion and will also be capable of operation at 48 per cent conversion and at reduced capacity. The alkylation unit will produce aviation grade gasoline.

Low-octane naphtha distillate will be charged to the desulphurization and reforming unit to obtain a high-octane reformate. Part of the gas produced will be recycled and the balance will be sent to the gas recovery unit. Before entering the reforming section the naphtha will be desulphurized. The existing processing at the refinery involves an integrated combination of crude topping, reduced crude visbreaking, gas-oil cracking, thermal reforming, vacuum reduction of tar, gasoline stabilization, gas recovery, and LPG production.

Welding Data Book

A data book that describes simplified welding procedures for all metals at reduced temperatures is available free from Eutectic Welding Alloys Co. Ltd, North Feltham Trading Estate, Feltham, Middlesex.

This pocket-sized book is a guide to improved welding techniques with torch and electric arc, and gives information on maintenance, repair, salvage, and fabrication with all metals. Procedures are also mentioned for obtaining maximum machinability in work-time and cost, with superior weld quality.

Flameproof Lighting Fittings

Many flameproof fittings for filament, mercury-vapour, and fluorescent light sources for use in oil refineries, petrochemical plants, and gas works are shown in a new catalogue issued by Victor Products (Wallsend) Ltd, Wallsend-on-Tyne.

A range of weatherproof dustproof junction boxes, covers, glands, and switches is also listed.

Complete sets of weatherproof flameproof lamps for oil derrick lighting can be supplied to customers' precise requirements.

New Miniature Recorder

Taylor Controls Ltd, 75 Hale End Road, London, E.17, have introduced a new miniature recorder, known as the Transcope.

It requires a panel cutout only 6 inches square and it is fitted with Servomatic power pens that are claimed to give 150 times the power of the conventional type.

The recorder receives three recorded or indicated variables, and has great sensitivity.

Continental Butterfly Valves

Fisher Governor Co., Marshalltown, Iowa, U.S.A., have acquired the Continental Equipment Co. The Fisher Governor Co. Ltd, Rochester, have included the Continental butterfly valves in the British-built Fisher range.

These valves may be operated by diaphragm motors, lever, or chain wheels and are suitable for air, gases, vapours, and liquids at low pressures.

Visual Flow Indicators

Sir W. H. Bailey & Co. Ltd, Patricroft, Manchester have been appointed sole distributors for the flow indicating equipment produced by the Dukes and Briggs Engineering Co.

The equipment at present comprises a range of visual flow indicators designed for high or low pressure systems, and capable of handling flows at any viscosity.

New X-ray Illuminator

Designed primarily for examination of industrial radiographs of a wide range of densities, a new X-ray illuminator has been introduced by Kodak Ltd of Kingsway, London, W.C.2.

Fluorescent tubes are used for the light source, and these allow viewing of radiographs in full room illumination. The new model is cool in operation and the absence of the usual ventilation holes prevents collection of dust through convection.

Spray Driers for Dry Powders

Illustrated and described in a new leaflet published by the Kestner Evaporator and Engineering Co. Ltd, 5 Grosvenor Gardens, London, S.W. 1, is a range of spray driers to produce dry powders.

Supplied in sizes to deal with outputs of 2½ to 5000 lb/hour, these machines handle brine solution, dyes, rubber latex, and many other chemical products.

Rapid Processing Photographic Projector

Designed in conjunction with the Ministry of Supply, a rapid processing photographic projector is now available from Kelvin and Hughes Ltd. This apparatus is claimed to solve difficulties of permanently recording and projecting information provided by cathode-ray tubes.

Processing of the film may take only 6 seconds and the film will keep indefinitely. Ilford Ltd have been closely connected with the development of suitable film which is of the 35 mm size.

The equipment has been sold in quantity to the United States and is there being used to investigate some air traffic control radar problems and to record data from high-speed computers.

Plastic Pipeline for Corrosive Chemicals

Said to be the longest plastic pipeline ever installed for the transfer of corrosive chemicals, a polyethylene pipe 6200 ft long is now in continuous use at Ashtabula, Ohio.

The pipeline, which has an inside diameter of 6·07 inches and is fabricated in 30-ft sections, links the zirconium and titanium sponge plant of Mallory-Sharon Metals Corporation and the sodium plant of U.S. Industrial Chemicals Co.

Constructed of USI's Petrothene high-pressure polyethylene with added carbon black, the pipeline is successfully conveying a brine solution at temperatures ranging from 80 to 90°F and at a pressure of 75 p.s.i.g.

Controlled Solubility Phosphate

A controlled solubility phosphate used in the downhole treatment of producing oil wells is described in a new bulletin available from the Calgon Co., Dept 241, Hagan Building, Pittsburgh 30, Pa.

The phosphate is formulated to prevent precipitation of calcium carbonate, calcium sulphate, and barium sulphate in the well bore and on downhole pumping equipment.

The bulletin contains solubility data, recommended dosages, schematic drawings, and examples of the application of the phosphate to different scale problems.

Fuels and Lubricants Service on London–Yorkshire Motorway

John Laing & Son Ltd, the contractors for the southern part of the London–Yorkshire motorway, have appointed the Mobil Oil Co. as sole suppliers of lubricants and fuels for Section C of the new highway.

Distribution of supplies to contractors' vehicles and plant will be by 1000-gallon tankers, 3-ton lorries, and Landrovers, bought specifically for the job, and all fitted with four-wheel drive.

It is estimated that over 60 refuellings will have to be made per shift and that during the whole operation contractors will use a total of 5 million gallons of gas oil, 760,000 gallons of petrol, 45,000 gallons of diesel oil, and 4000 barrels of lubricants.

Automatic Keyboard Instructor

"Saki", the Solartron Automatic Keyboard Instructor, shown at the Physical Society's Exhibition in London in March, is claimed to be the world's first thinking electronic teacher.

Designed for the training of operators of punched-card machines, Saki takes the pupil step by step from the beginning to the final proficiency with complete personal tuition. The rate of instruction automatically adjusts itself to the pupil's ability and progress. The final result gives an operator with a completely balanced skill and great accuracy.

Saki is claimed to train the average pupil to become a full-speed touch operator in 18 hours, instead of the normal 50 hours. A class of seven can be dealt with in the early stages and this can be increased later, if required.

Full details of the new machine can be obtained from the Solartron Electronic Group Ltd, Thames Ditton, Surrey.

New Flame-Failure Equipment

A new flame-failure and ignition programming control unit can be used with almost any industrial oil or gas burning equipment that is required to start up automatically by remote control or time-clock.

An infra-red cell is employed as the flame detector and the unit embodies an a.c. amplifier so that it responds only to the fluctuating infra-red radiation characteristic of all flames and is unaffected by glowing refractory.

It can be used with burners having direct spark ignition or spark-ignited gas or light-oil pilots which may either remain on or be switched off after establishment of the main flame, and it operates in conjunction with various types of temperature control.

Further details may be obtained from Elcontrol Ltd, 10 Wyndham Place, London, W.1.

Tower Packings

The Hydronyl Syndicate Ltd have been granted by the United States Stoneware Co. the sole licence for the manufacture, use, and sale of "Intalox Saddles". This type of tower packings has recently found rapidly increasing application in America, and is now made by Hydronyl from their well-known hy-contact acid-resisting ceramic body in a wide range of sizes.

Particulars may be obtained from The Hydronyl Syndicate Ltd, 14, Gloucester Road, London, S.W.7.

FOR SALE

HYD-ROBOT LOW TEMP. fractional distillation apparatus with spare parts. Inspection arranged. Offers invited.

Further particulars from Mr. E. F. Jones,
Materials Department,
Shell Refining Co. Ltd,
Stanlow Refinery,
Ellesmere Port,
Wirral, Cheshire.
(Tel. Ellesmere Port 3600; Extn 1350).

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Young man, 24, recently married, int.B.Sc., Sandhurst, 2 yrs refining experience Middle East, desires position as marketing assistant at home or abroad. Available U.K., May. Box No. 1121, IP REVIEW.

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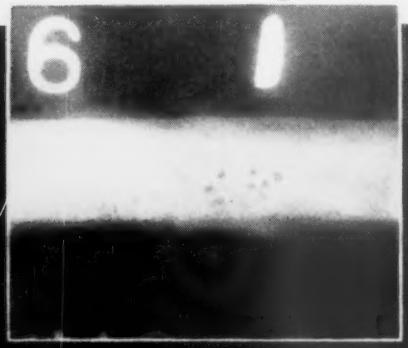
SCIENCE AND THE STEEL TUBE AGE : 5

RADIOGRAPHY

As a check upon the soundness of a welded joint, whether in a pressure vessel or a structure, the radiograph plays a vital part. Today, X-ray apparatus has been largely superseded as a source of radiation by radioactive isotopes. These have many advantages, including manoeuvrability in awkward and confined spaces, and are particularly useful for examining welds on site. Many inspecting authorities require that welded pipe-joints in modern power stations be examined by this method. Stewarts and Lloyds, always quick to adopt suitable new techniques and to develop them to the full, have extended this method of inspection to such a degree that the Company is now among the largest users of isotopes in the country. Various methods of inspection are employed, each suited to a particular application or condition, and new refinements are constantly being introduced. The two radiographs show, left, a weld containing small defects and, right, a good weld. The drawing in the background shows the examination of high-pressure pipework in a power station.



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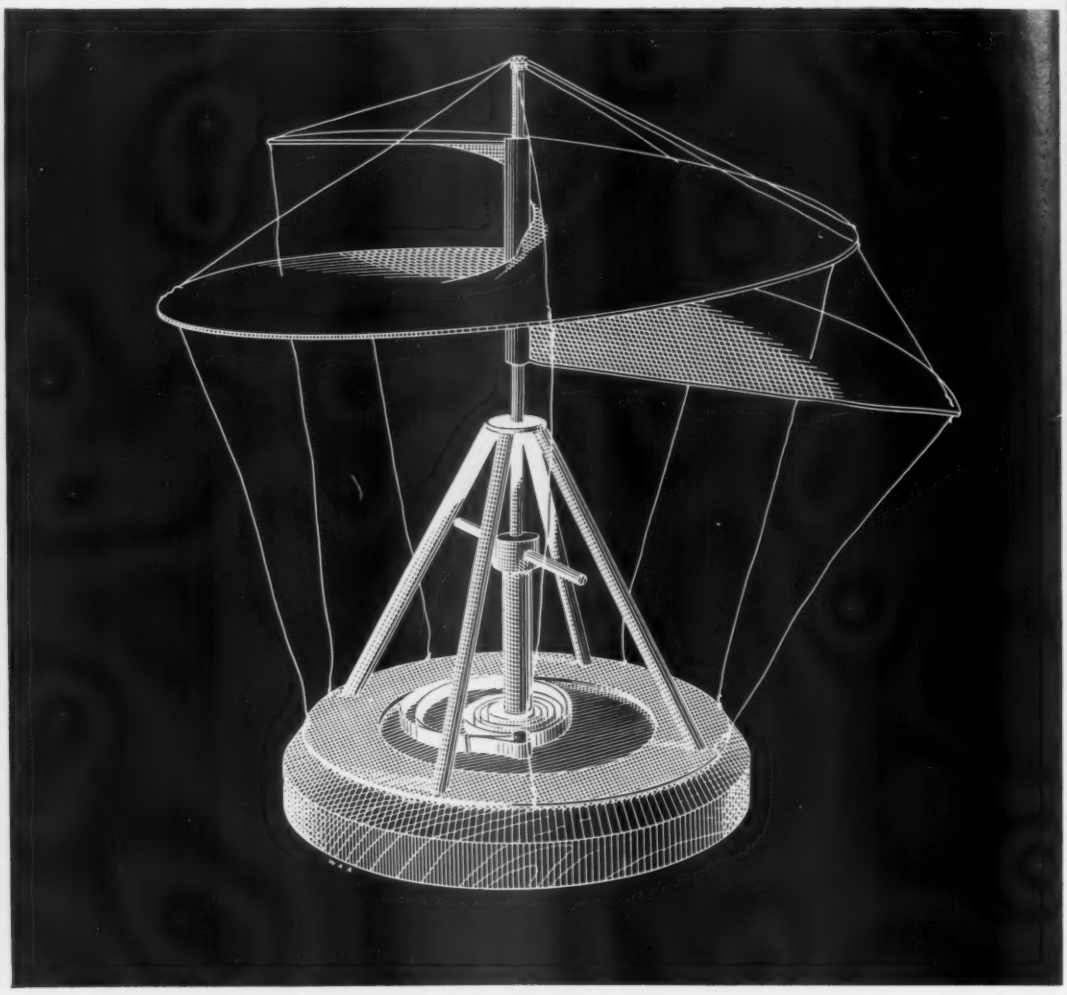

From a Science Museum Photograph.

A flying machine for the Borgias

During 1502 Cesare Borgia employed Leonardo da Vinci as his military engineer. But not until this century have the full potentialities of Leonardo's designs been appreciated. With greater resources of power at his disposal there is no knowing what technical advances he might have achieved. During his lifetime the soaring imagination behind such inventions as this helicopter was frustrated by the tug of gravity and the grip of friction. To overcome the one, power was needed: to overcome the other, lubricants. It was not until 250 years after Leonardo's death that men began to utilise the power that lies in coal, and another 100 years passed before the immense possibilities of mineral oil for power and lubrication were discovered. Vacuum Oil Company — now Mobil Oil Company — was founded in 1866, only seven years after the sinking of the first commercial oil well. During the succeeding 91 years the company has pioneered many of the technological advances that have made Leonardo da Vinci's dreams into modern common-place. Today, Mobil products are known and used throughout the world, setting the standard of quality for products of their kind.

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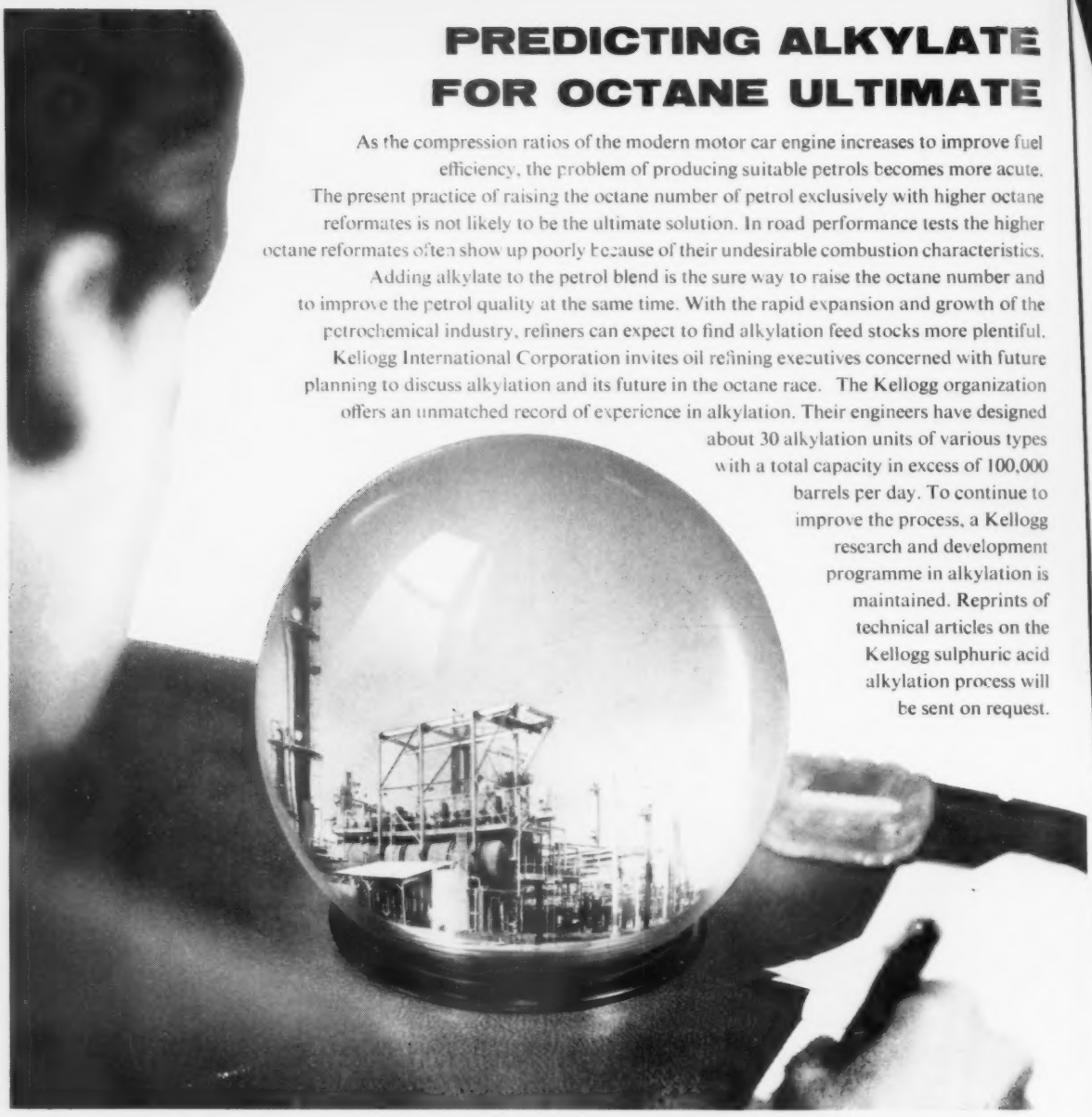
As the compression ratios of the modern motor car engine increases to improve fuel efficiency, the problem of producing suitable petrols becomes more acute. The present practice of raising the octane number of petrol exclusively with higher octane reformates is not likely to be the ultimate solution. In road performance tests the higher octane reformates often show up poorly because of their undesirable combustion characteristics. Adding alkylate to the petrol blend is the sure way to raise the octane number and to improve the petrol quality at the same time. With the rapid expansion and growth of the petrochemical industry, refiners can expect to find alkylation feed stocks more plentiful. Kellogg International Corporation invites oil refining executives concerned with future planning to discuss alkylation and its future in the octane race. The Kellogg organization offers an unmatched record of experience in alkylation. Their engineers have designed about 30 alkylation units of various types with a total capacity in excess of 100,000 barrels per day. To continue to improve the process, a Kellogg research and development programme in alkylation is maintained. Reprints of technical articles on the Kellogg sulphuric acid alkylation process will be sent on request.



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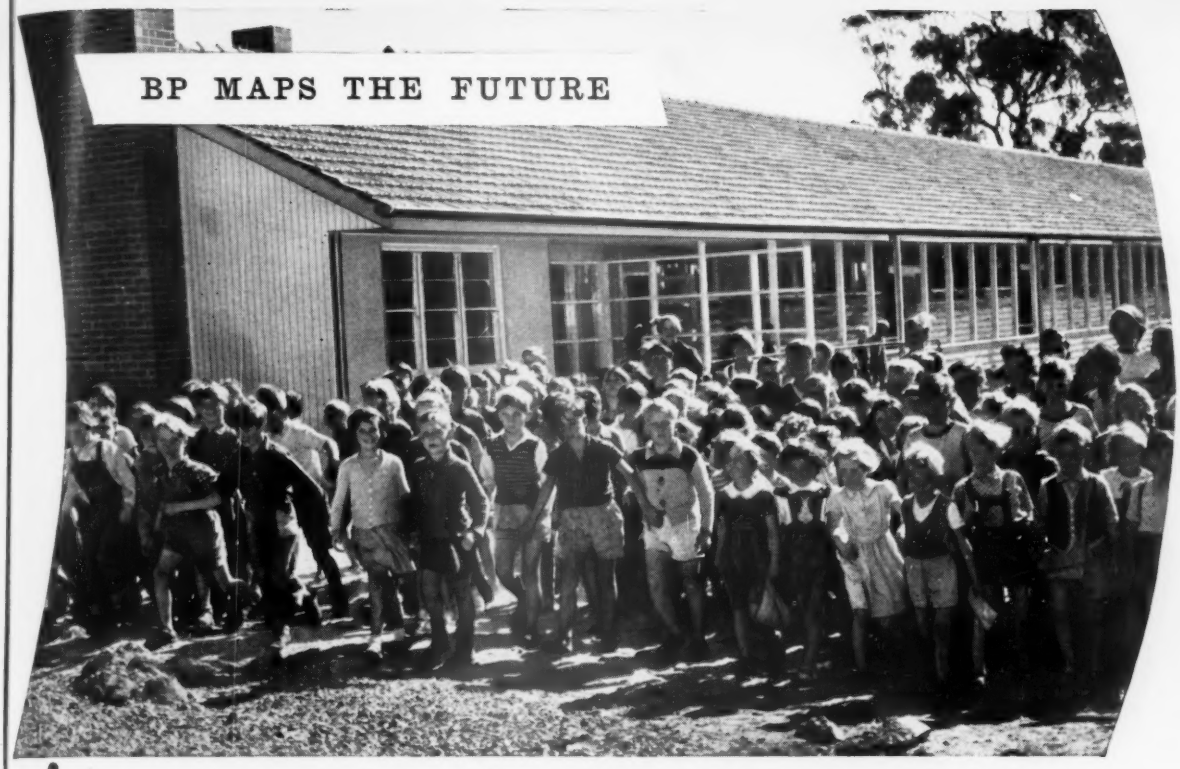

Children of Medina, the new township near Kwinana Refinery, outside their splendid modern school.

A new township springs up in Australia

SEVENTEEN MILES south of Fremantle, the main port of Western Australia, is Australia's biggest refinery – Kwinana – owned and operated by one of the British Petroleum group of companies.

Nearby a new township has risen amid the gum trees and casuarinas of the Australian bush. Named Medina, it has been built by the Western Australian authorities as the first part of a large new town to house many thousands of people whose livelihood will be mainly bound up with oil.

This new town has been planned not only for personnel of Kwinana Refinery, but also for employees of the new industries attracted to the area by the building of the refinery, with its ready supply of fuel oil and other products.

Kwinana started operating in 1955, and can now process 3,000,000 tons of crude oil a year. Important new plant is at present being added to meet Australia's ever increasing demand for oil products.

In Australia, as elsewhere, The British Petroleum Company plans the future by taking practical steps today.

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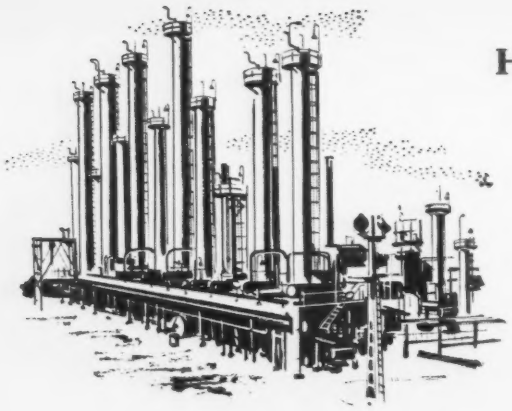

Harper Castings play their part in Oil Refineries in many parts of the world

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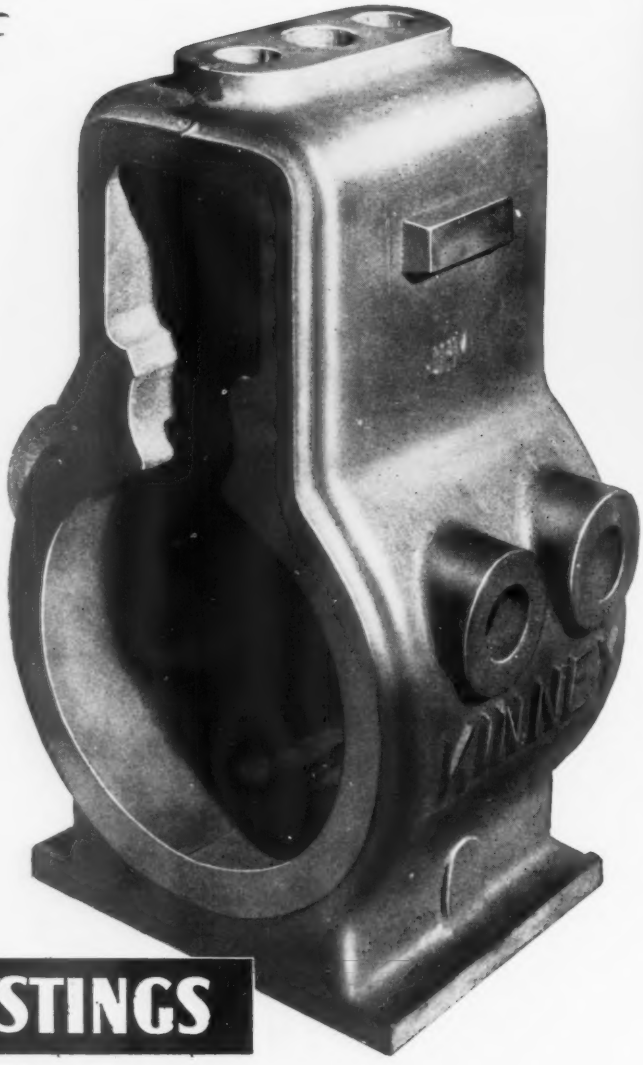

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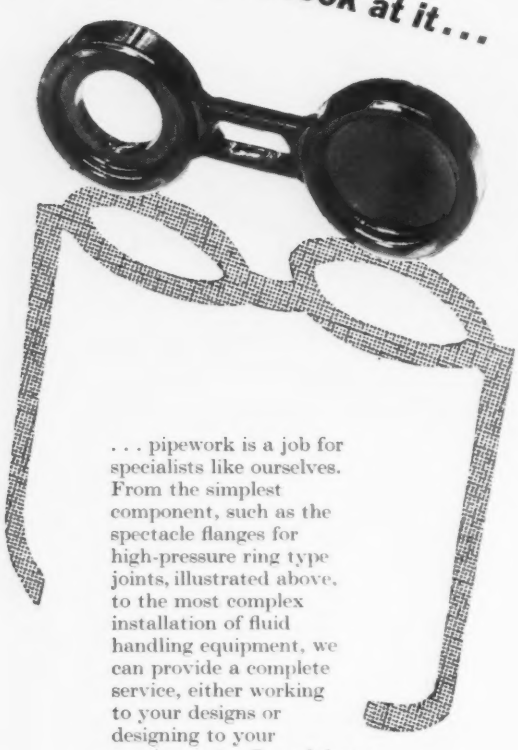

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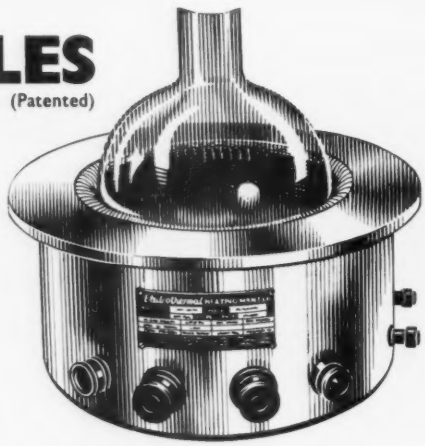

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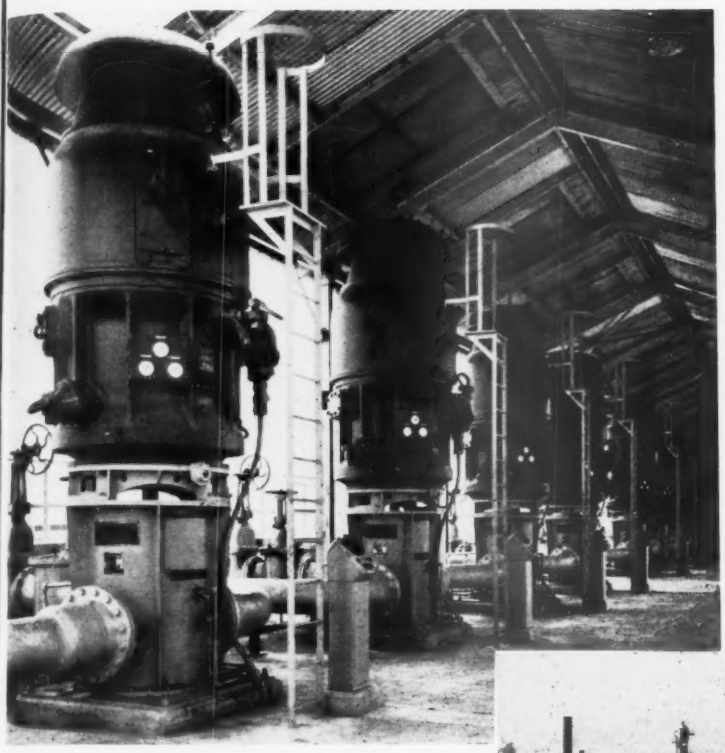
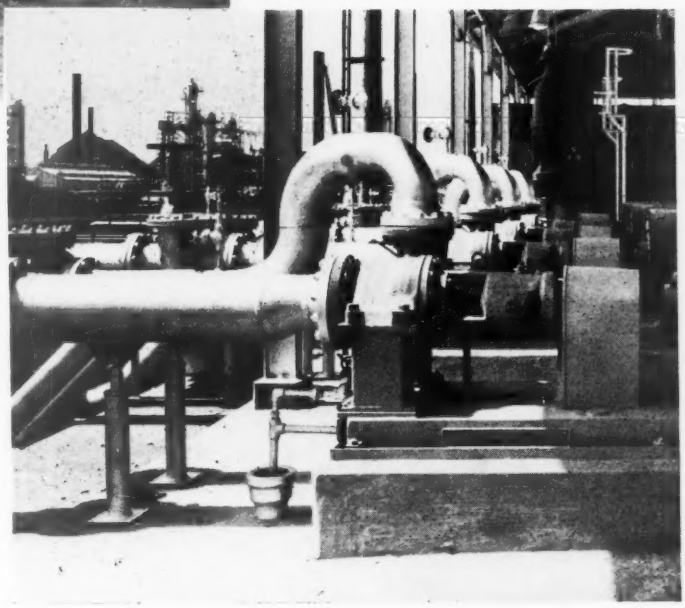


Aden Petroleum Company Refinery



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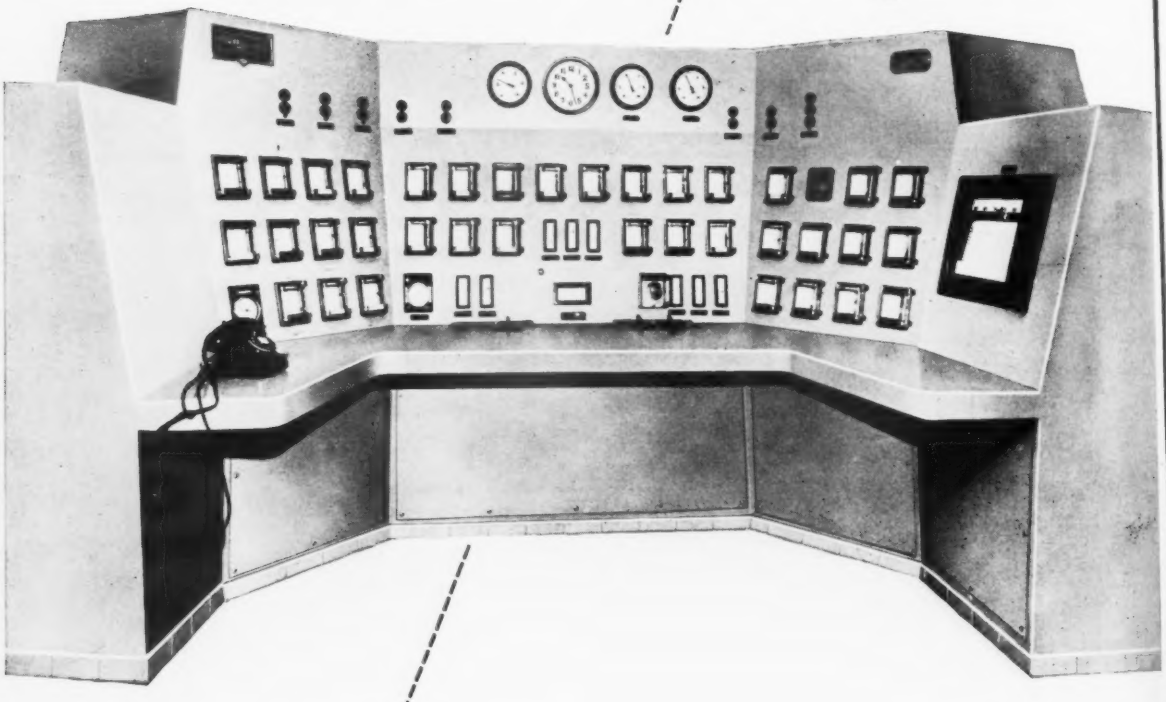

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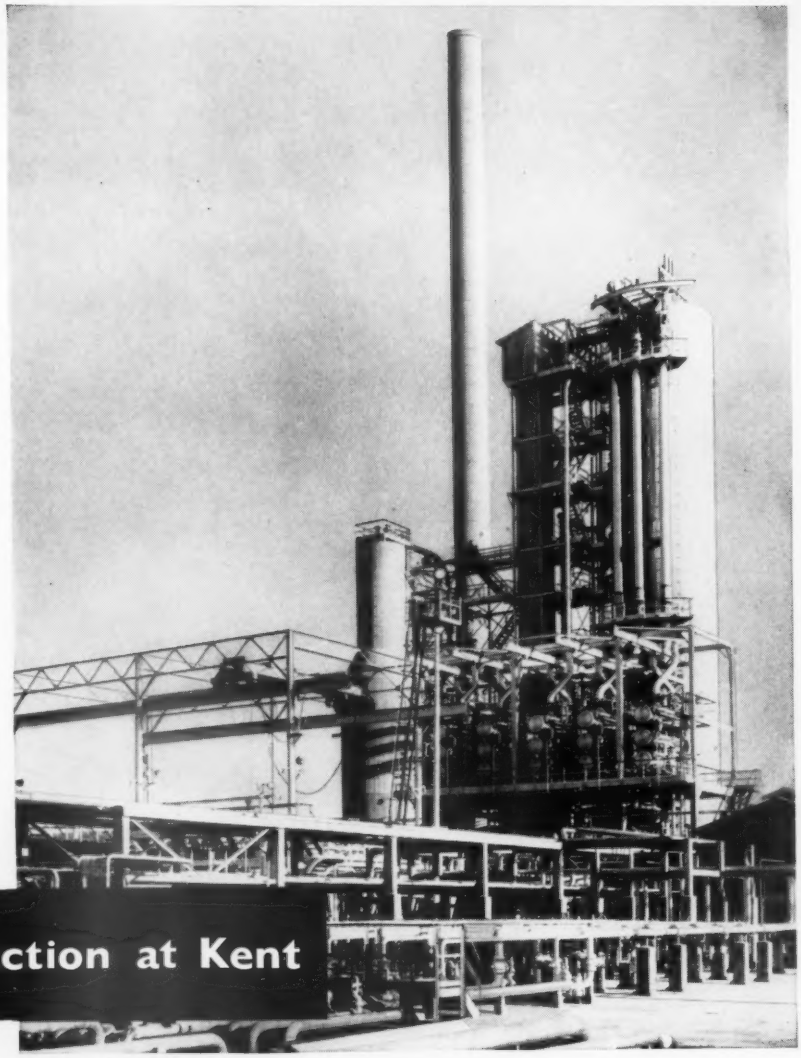
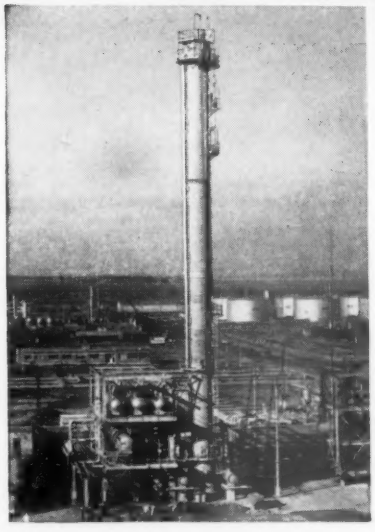


Construction at Kent



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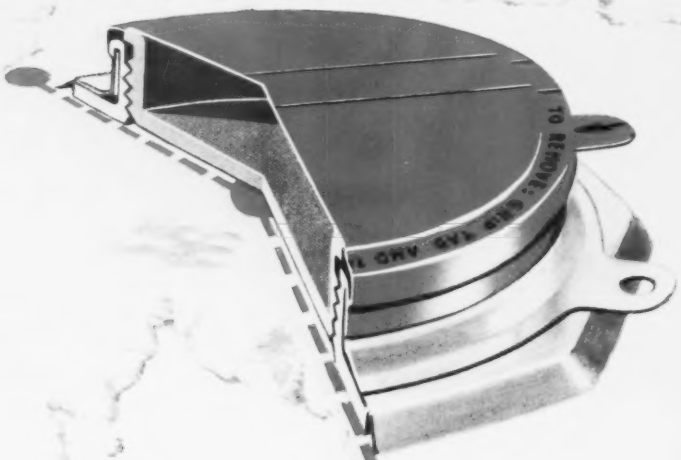

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